Commercial Fisheries Abstracts

a monthly summary of important developments for the fishery industries

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- Electro Smoking — P.3
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Vol. 9 No. 8 **August 1956**

Fish and Wildlife Service
U. S. Department of the Interior
Washington D. C.

UNITED STATES
DEPARTMENT OF THE INTERIOR

FRED A. SEATON, Secretary

FISH AND WILDLIFE SERVICE

JOHN L. FARLEY, Director

Commercial Fisheries Abstracts

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The abstracts in this leaflet may be left in their present form; but it is suggested that to make the most efficient use of them, they be cut out on the lines designated and filed by the number in the upper left-hand corner of each. For a full description of this filing system see "Fishery Technological Abstract Card System" by Maurice E. Stansby and K. L. Osterhaug, Fishery Leaflet No. 232, obtainable free by request from Fish and Wildlife Service, Washington 25, D. C.

In addition to the regular abstracts, there is included a bibliography of references of secondary importance (without abstracts). These may be cut off on the lines designated and pasted on standard 3 x 5-inch cards for filing.

Following is a brief outline of this filing system. The numbers apply to the first digit appearing on each card. For the meaning of subsequent digits, please see the above described leaflet.

0	General and theoretical	5	Vitamins
1	Fish by species	6	Fishery byproducts
2	Fresh fish	7	Analytical Methods
3	Preserved fish	8	Composition
4	Oils	9	Miscellaneous

Issued with the approval of the Bureau of the Budget, December 29, 1953

0.118 INSTRUMENTS TO CONTROL PRODUCT QUALITY, PART 1. MODERN SCIENTIFIC INSTRUMENTS MEAN SUCCESSFUL OPERATION OF CANNING FACTORIES

Gould, Wilbur A. (Ohio State University)
Food Packer 37, 30-32 (March 1956)

Instrumentation for control of product quality is a tremendous forward step in successful plant operation because it means control of quality at predetermined levels.

For successful control of product quality, management must provide for the following three factors: (1) a laboratory properly equipped to carry out basic testing and quality control analyses or procedures; (2) a trained food technologist who understands; (a) how to obtain representative samples of the raw product, the product during processing, and the finished product; (b) laboratory and instrument techniques; and (c) the interpretation of the quality data obtained; and (3) a desire by management for information on quality and an understanding of how to use the information obtained to control product quality at desired levels.

Quality may be defined as "the combination of characteristics of a product that have significance in determining the degree of acceptability of the product to a user." If all of the characteristics of quality could be evaluated from data obtained through the use of instruments and if appropriate standards of quality were established, the quality of processed products could be controlled or maintained at the desired level or levels of acceptability.

Basic laboratory instruments.--The first essential instruments needed by any quality control technologist are shown in figure 1. These include a center temperature measuring device, a vacuum gage, drained weight screens (2 and 8 mesh), an accurate scale, and size grading screens. Figure 2 shows a head-space gage. In most canned products it is required that the can be filled to 90 percent of capacity. Figure 3 shows a hydrometer being used to evaluate the Brix value in

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 ABSTRACTER: Kathryn L. Osterhaug

2.1128 CRAB POTTER HAS LUCK WITH USE OF ZINC ANODES

Anonymous
Southern Fisherman 16, 163, 165 (April 1956)

Zinc anodes have been proving very successful in preventing corrosion of wire mesh crab pots.

A Diggs, Virginia crab fisherman sets out 80 to 90 pots in the rough water of Chesapeake Bay where corrosion and tides tend to damage pots rapidly. During the crabbing season, between April and November, an ordinary galvanized mesh crab pot would rust away at the rate of three a season. The crab pots used in this area make use of a heavy iron frame around the bottom of the pot to protect them from the heavy tidal action in the area. These frames have also been subject to much damage by corrosion.

Experiments on the use of the zinc anode were started in 1953. By the 1954 season the pots were being used. A 1 pound anode is wired near the bottom of the pot as can be seen in the accompanying photographs. It is not placed on the bottom because the surrounding mud tends to interfere with the ionic action.

Shortly after going into the water the wire mesh becomes very bright and stays that way as long as the trap is being used. The crab pots now withstand a full seasons use and could probably be used a

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Crab pot with the zinc anode, lower right, in the crab pot.

 ABSTRACTER: Kathryn L. Osterhaug

1.81 TECHNOLOGICAL RESEARCH WITH SOUTHERN OYSTERS

Lee, Charles F. and Pepper, Leonard (Fishery Technological Laboratory, College Park, Maryland)
Southern Fisherman 16, 55, 57, 59, 63 (April 1956)

Three contracts for technological research on the Southern oyster are being supported by funds from the Saltonstall-Kennedy Act.

Contract 1.--Dr. E. A. Fieger and his staff at Louisiana State University in Baton Rouge, have contracted to investigate factors affecting frozen storage of raw shucked oysters.

Contract 2. --Dr. Betty M. Watts and the staff of the School of Home Economics of Florida State University, Tallahassee, are working on the development of new cooked Southern oyster products for frozen storage. Studies are also being made of vitamin losses during frozen storage, seasonal changes in pH and vitamin content, and of oxidative changes by means of the thiobarbituric acid test.

Contract 3.--Dr. Milton Fingerman at Tulane University in New Orleans has contracted to do some basic physiological research on body fluid balance in live Southern oysters.

Coordination of the work of the several projects is being accomplished by staff members of the Fish and Wildlife Service stationed at the College Park, Maryland Technological Laboratory. This group has also been determining the chemical composition of Southern oysters as influenced by seasonal and geographic factors. The results of their determinations are given in figures 1, 2 and 3, over.

Dr. Fieger's group placed their first lot of oysters in storage in May 1955, and have been examining them monthly for amount of drip and for total bacterial count. They have also conducted organoleptic tests for quality.

Oysters packaged unglazed, but overwrapped, had a storage life of about six months. The oysters that had been glazed with water and with weak brine were still acceptable after eight months. The best test scores were received by oysters packed in tin under an 18-inch vacuum.

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 ABSTRACTER: Kathryn L. Osterhaug

2.118 REFRIGERATED TRANSPORT - BOATS

Walderhaug, S. (European Shipbuilding, Radhusgate 8, Postbox 162, Oslo, Norway)
World Fisheries Abstracts 7, 3 (January-February 1956)

Describes the different types of refrigerants and their uses in marine refrigeration. The advantages and disadvantages of Freon-12and ammonia are discussed. Granulated cork has lately been more and more replaced by fiberglass and mineral wool as an insulation material. The application of the insulation, however, has not always kept abreast of the technical development and it is still usual to see wood battens directly connected to frames and deck beamsin spite of the fact that it increases the heat leakage through the insulation. The wood battens should be placed between the frames at convenient intervals, and fastened to frames or deck beams by distance pieces. It is better to have airducts made of welded thin steel plates between deck beams instead of wood, as wood warps after some time and causes heat leakage in the insulation. The heat loss through the deck may be reduced by cutting slots in the deck.

The compressor sizes of 41 Freon-12 marine refrigerating plants, operating at temperatures of -20° C. (-4° F.), 0° C. (32° F.) and 11° C. (51. 8° F.) have been examined. These plants when used have shown themselves to be of sufficient size. To arrive at a formula for calculation of the compressor cylinder volume, the following data have been laid down: compressor piston clearance, 45 percent; average temperature of decks, shipside and bulkheads, surrounding the refrigerating rooms: 40° C. (104° F.); heat transmission through insulation: 0.4 K. cal./m^2/° C. When carrying fruits at 0° C., fans are provided to circulate the air 50 to 60 times/hr. When carrying frozen cargo 35 to 45 circulations/hr. will be sufficient. The developments in marine refrigeration seem to lead towards lower freezing temperatures. Considering the fact that transport by sea is relatively rapid, little would be gained by setting the transport temperature below -20° C. (-4° F.) with

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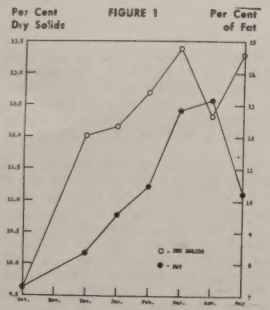
LABORATORY INSTRUMENTS

FREEZING OYSTERS

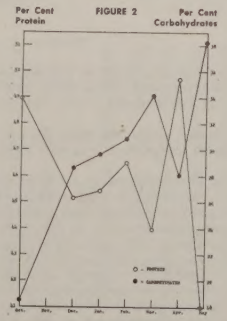
ZINC ANODES ON CRAB POTS

MARINE REFRIGERATION

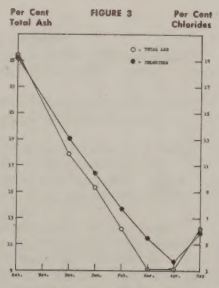
1.81 (Cross Reference 3.239, 3.235)



Seasonal variation of dry solids and of fat in Southern Oysters, calculated on dry basis, starting with October of 1954.



Seasonal variation of protein and of carbohydrate in Southern oysters, calculated on dry basis, starting with October of 1954.



Seasonal variation of total ash and of chlorides (NaCl) in Southern oysters, calculated on dry basis, starting with October of 1954.

2.118

the present refrigerating liquids and insulating materials. To reduce the temperature from -20° C. to -25° C. (-13° F.), the machinery capacity should be increased by 25 to 30 percent and at the same time the limit of between 1- or 2-stage compressors would be approached. The insulation would also have to be increased at the expense of the cargo, capacity. There will certainly be developed other refrigerating liquids and insulating materials which, within a few years, will compensate for these deficiencies. The Freon 22, for instance, is a refrigerant which is much more convenient at lower temperatures than the refrigerants used up to now.

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canned apple juice. Hydrometers are specific for various solutions and can be obtained to evaluate salt content of brines, various chemicals such as alcohol, and syrup strengths in packing fruits.

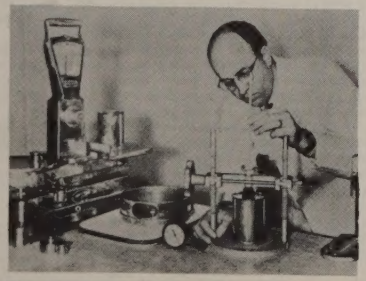


Fig. 1. Necessary instruments in any laboratory are can opener, center temperature measuring device, vacuum gage, grading trays, drained weight screens and scale.

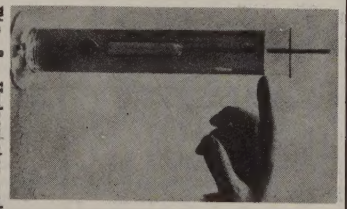
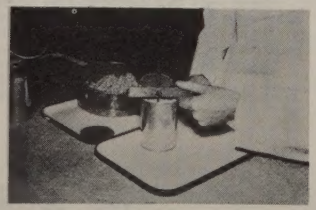


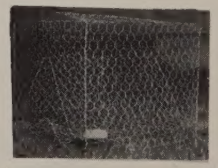
Fig. 3. Hydrometer and cylinder for determining Brix's value.

Fig. 2 A head-space gage is a "must" instrument in the quality control lab.



2.1128

second season if they didn't rust away during storage ashore. It is thought that the pots might be dipped in creosote when brought in for the winter and thus be protected for a second season of use.



A close-up showing the construction of the crab pot and the location of the zinc anode.

3.12 WHAT ANTIBIOTICS PROMISE

Malaspina, Alex S. (Charles Pfizer and Company)
Pacific Fisherman 54, 20 (April 1956)

The methods by which food spoilage takes place includes the following: (1) oxidation, (2) desiccation, (3) enzymatic action, and (4) microbial growth.

Most methods that have been devised to prevent spoilage have a tendency to change the flavor, texture, or general character of the food. Refrigeration does not change the fresh characteristics of the food, but is effective for a very limited period of time with most products. Prior to the discovery of antibiotics, no non-toxic chemical compound was available that, in minute quantities, would extend the storage life of a food in the fresh state by effectively inhibiting bacterial growth.

As currently used, the term "antibiotic" designates a metabolic product of a microorganism that restricts the life activities of other microorganisms.

Antibiotics such as oxytetracycline and chlortetracycline, that are active against a large number of bacteria, both anaerobic and aerobic, are said to have a broad antibacterial spectrum. When added to foods at practical low levels, these substances are not bactericidal but are bacteriostatic. They inhibit growth and development. By depressing the rate of bacterial spoilage, they prolong the normal storage life of a product. For best results, antibiotics must be used in conjunction with refrigeration. They are effective only when the food processor practices good sanitation and cannot be used to disguise spoilage that has already occurred or to reclaim heavily contaminated food.

Some very promising studies have been conducted on the use of antibiotics in fish. Of the three types of spoilage that occur in fish, bacterial, oxidative, and enzymatic, the first is the most important in most species. It appears that antibiotics can assist in extending the freshness of fish and in preventing important economic losses to the industry.

Treatment with antibiotics should start as soon as the fish have been caught. The antibiotic may

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 ABSTRACTER: Kathryn L. Osterhaug

3.237 REGIONAL MEETINGS CLARIFY FACTS ABOUT STANDARDS

Anonymous
Quick Frozen Foods 18, 66-68, 70 (April 1956)

A series of regional meetings was held by the Fish and Wildlife Service to get the final thinking of the fish stick industry on a working set of standards for their product. Meetings were held in New York City, Atlanta, Dallas, Los Angeles, Seattle, Chicago, Boston, and Washington, D. C.

Fish sticks are the first fishery product for which government quality and grade standards have been framed. The fish stick standards being promulgated by the Fish and Wildlife Service are provisional and voluntary. Because they are voluntary they can be used by anyone.

In defining the standards the following points were outlined:

1. Standards must be based on the actual styles of the product being produced now and not on theory.
2. Standards must be national.
3. They must take all important factors into consideration.
4. They must allow for optional or personal choice as to container size and should not be designed to limit production of a new product.
5. They itemize the proper factors upon which quality is based.
6. They should incorporate tests for use in determining compliance with the standards.

Products that do not fit into the Product Description as given in the standards cannot be

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 ABSTRACTER: Kathryn L. Osterhaug

3.237 PACKERS CALL FOR OVERHAULING TO SAVE FISH STICK IN INDUSTRY

Anonymous
Quick Frozen Foods 18, 56, 87-90, 92, 93 (April 1956)

While conducting a nationwide survey of fish stick packers, Quick Frozen Foods asked the following questions:

1. Production of fish sticks increased 31 percent in 1955 over 1954. However, the last quarter of 1955 actually showed a slight decline in fish stick production over the same period the preceding year. Do you believe that sales of fish sticks are leveling out and that the rate of growth will decline in the future?

2. Do you believe the 8 ounce fish stick package has been a good thing for the industry?

3. Are you for voluntary fish stick grade standards? If so, why? If not, why not?

4. Have you any suggestions which, if adopted, you believe would benefit the fish stick industry?

Most packers queried agreed that the fish stick boom has begun to peter out. They placed the blame for this premature decline on indifferent quality, price wars, and questionable packaging.

It is felt that the most unfortunate part of the declining fish stick market is that optimum sales volume had not been achieved. One packer stated that he foresees a continuation of the slow decline if the two situations continue: (1) If some packers persist in cutting quality in order to offer lower

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 ABSTRACTER: Kathryn L. Osterhaug

3.4 SMOKING METHODS AND EQUIPMENT - MECHANICAL SMOKING

Subba Rao, G. N. (Abstracter)
World Fisheries Abstracts 7, 37 (January-February 1956)

(a) For some time now fish have been smoked in an electrostatic field in Germany. The plant consists of a smoke producer with smoke conveying equipment and the smoking oven with the electrical installation to produce the necessary D.C. voltage as well as the control devices. The mode of operation of the process depends on the potential difference between the electrically charged smoke particles and the surroundings. The particles, charged negatively, travel towards the positive pole. The smoke will be negatively charged with electricity; the smoke particles will be attracted by the fish which is connected to the earth through a continuous wire conveyor passing through the smoke chamber. If the smoke is not electrically charged and is blown against the fish, some smoke would stick to the fish, but only a small quantity. The great advantage of the electrostatic smoking as compared with any other kind of smoking can be seen. It is in the operator's hand to limit the smoke to the exact requirements by adjusting the electrical characteristics and to smoking the fish in a few seconds in the desired manner. Only the original smoke flavor is conferred instead of artificial flavors. In the electrostatic smoking plant, there is a wire carrying electric current, which sets up an electric field around it. The smoke blown into this field from the smoke producer is charged electrically and is attracted by the fish, which are oppositely charged. The plant is very simple in its design and can, therefore, be supervised by the trained staff. The supervision is limited to furnishing the smoke producer with wood about once an hour and the switching on and off of the electrical device. Automatic electric switches are provided in order to disconnect certain parts in case of a mistake by supervisors. The consumption of the electric current is not higher than that of an average electric light bulb.

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ANTIBIOTICS FOR FISH

FISH STICK INDUSTRY

FISH STICK STANDARDS

ELECTRO SMOKING

3.237

prices to buyers, and (2) if buyers persist in buying on price alone regardless of quality.

There was general agreement in regard to the need for fish stick grade standards. Some members of industry even felt that they should be mandatory. It was felt that in the long range, voluntary fish stick standards will do more to build consumer confidence and demand than any other single factor.

One suggestion was for industrywide promotion. "We believe it would be helpful if the whole industry could meet on a common ground of supporting an industrywide advertising and educational campaign."

3.4

(b) A device for the electric smoking of fish has been developed in Canada. A pilot installation, for salmon treatment, is actually being used on the western coast of Canada. The fish, placed on a conveyer belt, are 'bombed' by smoke particles, charged at 12,000 V. The smoking period is reduced from a few hrs. to 8 min. The principle of this technique is simple. The smoke particles from a smoke generator are charged positively and passed over the fish conveyed by the belt charged negatively i.e., connected to the earth. The smoke particles will be attracted by the fish. In the conventional systems of smoking, the penetration of smoke takes place only when the particles accidentally hit the fish. The 'Beta Electric Power Pack,' the name of the equipment, is composed of a metal box containing the high voltage generator. The front part of the equipment carries the control apparatus and that for electrically charging the smoke is placed close to the smoke generator. Skilled personnel are not required for operating this equipment.

(c) is a translation of (b).

3.12

be applied as an ingredient of refrigerated sea water used to store the fish in a concentration of about 1 ppm. A second procedure is to dip the fish very briefly in a 50 to 100 ppm solution of antibiotic just before icing. A third method of employing the antibiotic is to incorporate it in the ice, at a concentration of about 5 ppm, used for packing the fish.

Antibiotics are more effective against bacterial spoilage in eviscerated fish than in round fish since they cannot penetrate the flesh sufficiently to combat the bacteria inside the viscera.

Fillets may be treated with antibiotics during the brining step that takes place prior to freezing.

When a new process or chemical agent is found to have application in food processing, it is necessary to establish its complete safety in use. When substantial evidence has been collected that in the antibiotic-treated food there is no residue remaining prior to consumption because of inactivation due to storage and/or cooking, clearance may be obtained from the Federal authorities for the use of the antibiotic in that particular food.

3.237

graded under this system. Thus, the standards do not apply to raw or unbreaded fish sticks or to fish products of different shapes and sizes. If processors want other sizes or types of fish sticks graded, new standards will have to be worked out for them.

When the fish stick standards are finally promulgated, U. S. Government food inspectors will receive a fish manual and special training in testing fish. This will provide a large pool of trained inspectors throughout the nation.

2.1123 CONSTRUCTION DETAILS OF IMPROVED TUNA LONG-LINE GEAR USED BY PACIFIC OCEANIC FISHERIES INVESTIGATIONS

Mann, Herbert J. (U. S. Fish and Wildlife Service, Honolulu, T. H.)
Commercial Fisheries Review 17, 1-10 (December 1955)

This report describes the latest type of fiber long-line gear now being used by Pacific Oceanic Fishery Investigations to capture tunas. The gear was not designed primarily for commercial use. Rather, the effort was directed toward developing a type of gear that would be extremely flexible and that could be changed rapidly for various types of experimental fishing.

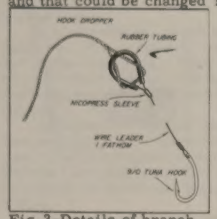

Fig. 3-Details of branch line, leader, and hook assembly.

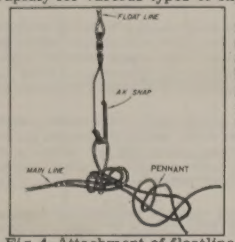

Fig. 4-Attachment of floatline to mainline at juncture of two skates.

The principal topics discussed in the report are the following: (1) general description, (2) fabrication of gear, (3) assembling lines for setting, (4) setting, (5) hauling, (6) materials used to make up gear. The article is illustrated by nine figures, four of which are included on this card.

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 ABSTRACTER: F. Bruce Sanford

2.15 BRINE TANK TESTS ON PACKER "J. R. D."

Anonymous
Western Fisheries 51, 12 (March 1956)

Scientists of the Fisheries Research Board of Canada in Vancouver, B. C. have proved that chilled sea water is a feasible method of carrying fish on trollers and packers. They are now going to investigate to find out if the same method will work on halibut boats.

Tests on the troller, Phantom II, and on the packer, J. R. D., have demonstrated that brine tanks keep fish in excellent condition for periods exceeding 14 days. They do not cut down on the carrying capacity of the vessel and do not effect the stability of the boat under normal weather conditions.

Refrigerated sea water tanks are now being installed in a new halibut boat being launched in Vancouver. The 76-foot Silver Viking had tank beds and frames built into its hull during construction. This years operation on halibut will be under the watchful eyes of Pacific Fisheries Experiment Station scientists who are eager to see improvement in the quality of the halibut landed.

The J. R. D. completed four regular trips from the fishing grounds to the cannery, using brine tanks. Each trip was a regular commercial salmon operation. The quality of the fish delivered was excellent. The elimination of the crushing of the fish seems to have been largely responsible for the excellent appearance and firmness of the salmon.

Loading and unloading of fish are much improved over conventional icing methods used on fish-packers. Loading involves only the dropping of the fish through the hatches. Brailing is the technique used for unloading.

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 ABSTRACTER: Kathryn L. Osterhaug

2.116 SARAH - TINY RADIO TRANSMITTER

Anonymous
Western Fisheries 51, 36 (March 1956)

SARAH is a letter abbreviation of Search And Rescue And Homing and is the name given a small radio transmitter or "beacon" designed to be carried by a survivor to assist in his rescue. The signal can be picked up within a radius of 66 miles by special frequency "homing" equipment on search craft.

SARAH's use to fishermen is obvious. If a boat is wrecked on a remote section of the coast or sinks offshore, the little radio beacon will send out signals to all rescue planes or boats immediately. Wide searching over large areas will be unnecessary as search craft will be able to pinpoint the survivor or wreck instantly as soon as the signal is received.

SARAH is soon to be used by the RCAF Rescue Service. Units based in British Columbia will be installing the new device around the end of March. Seven receiving units will be installed in RCAF search planes.

The part of the apparatus of interest to fishermen is the transmitter. In spite of its small size it is very rugged. It is completely impervious to water, and temperatures from 58° below zero to 158° above zero have no effect on it.

The beacon weighs just 7-1/2 ounces complete with folded antenna, the power supply battery weighs 29 ounces, and the coding unit weighs 8 ounces. The total weight is less than 3 pounds.

On fishing vessels, the radio equipment could be stored with the lifesaving equipment, or attached to a boat or dinghy.

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 ABSTRACTER: Kathryn L. Osterhaug

2.14 FISHING METHODS AND GEAR - ELECTRICAL

Denzer, H. W., Norman, G. and Loukashkin, A. S.
World Fisheries Abstracts 7, 21 (January-February 1956)

(a) Electro-fishing in W. Germany is subject to a special licence. It is to be used only in the following cases: if no other fishing method is possible; if useless fish are to be removed; if valuable fish are to be carefully caught; if the number of fish remaining after drainage of water are to be investigated; if the fish population is to be checked and also for scientific purposes. The electro-fishing method, when properly applied, damages neither the fish nor its eggs or fry, nor their food-fish. Not only the conductivity of the water, but also that of the bottom has to be considered. Crystalline stones (granite) at the bottom are most suitable. Sandstone, lime, dry sand and gravel are less suitable. Wet sand and gravel, mud, clay, brown coal, etc., are most unfavorable. The nature of the gear to be used depends on the conductivity. In case of small conductivity using battery operated gear is suggested; with moderate conductivity, medium type gear; in the case of high conductivity, heavy electrical gear may be used. A metal hoop net is used as anode and phosphor-bronze wire serves as cathode. The cables should not be longer than 25 m. (82 ft.). Electro-fishing should always be carried out by several persons. In flowing waters, fishing is carried out against the current. The distance between the electrodes should not exceed 25 m. The operator wades in the water. In wider expanses of water, the gear is operated from a boat in a zigzag course. Some fish, like carp and eels, react very slowly. In stagnant waters, the procedure is the same. In large lakes, only littoral fishing is effective. Only in the cold season can fish favorably be taken from shoals in large waters.

(b) Five different types of current forms were studied: (1) the square wave form of D. C. pulsating at low frequencies; (2) application of higher frequencies of pulsating D. C. using triangular and square wave forms; (3) application of half-wave rectified 60 cycle A. C.; (4) application of quarter-

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TUNA LONG-LINE GEAR

TINY RADIO TRANSMITTER

REFRIGERATED BRINE FOR FISH

ELECTRO-FISHING

2.116

The entire unit is small enough to be carried in a pocket. The beacon will transmit for twenty hours continuously.

2.14

wave rectified 60 cycle A.C., and (5) application of the condenser discharge impulse. Sardines were found to be highly susceptible to stimulation by electrical currents, showing some reaction even at the lowest values of average current density. Once the optimal range of average current density required to produce directional swimming and control of fish movement was established, the reaction of the sardines always remained identical regardless of the number, sequence of tests, or length of time in captivity. The topsmelt and jacksmelt usually became conditioned to the current after 5 to 10 sucessive stimulations. When the fish movements were fully controlled by the proper value of average current density the natural fright reaction were suppressed and the fish could easily be picked up by hand. All wave forms tested could produce full control of fish movements, forcing them to the positive pole where they were held until the current was turned off. Current density was found to be the most critical factor in producing forced directional swimming and control of fish movements. Average current densities above the optimal range may cause temporary paralysis or even death of the fish, while those below will produce only a slight directional impulse or none at all. The optimal average current density required appears to vary inversely with the size of the fish. Any frequency of current pulsation from 2 to 80/sec. (the highest tested) can give full control of fish movement and directional swimming. A pulse frequency as high as 60 to 80/sec. reduced the average optimal current density to 50 percent of the amount required at a frequency of 5/sec. The use of either continuous or interrupted half-wave rectified 60 cycle A.C. produced the most effective results as far as smoothness of operation and school coordination were concerned. A substantial decrease in power requirements was obtained with a condenser discharge pulse operating at the very low average current densities of 0.4 to 0.8 milliampere/sq.in. of cross-sectional area of water.

2.1123

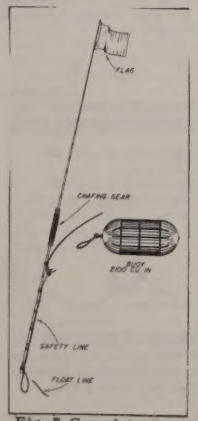


Fig. 7-Complete flag and float assembly, showing chafing gear.

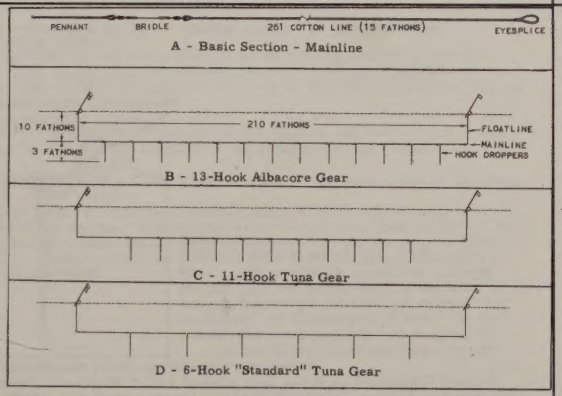
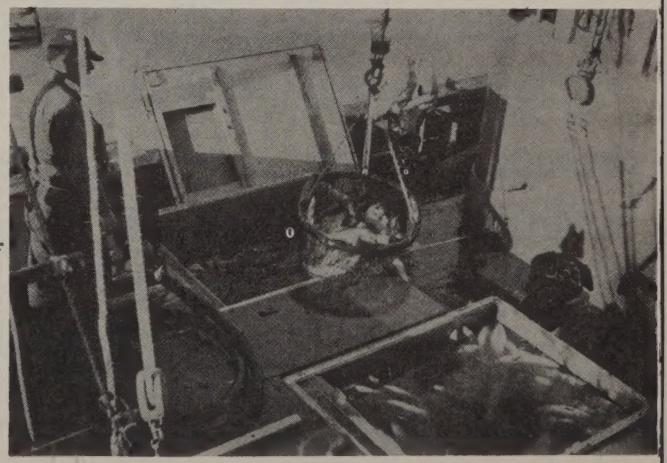


Fig. 1-Three types of POFI long-line gear, and the basic component of their mainlines. A -15-fathom section used in making up mainlines, B - 13 - hook basket (unit) designed for albacore fishing. C - 11-hook basket used in fishing for larger tunas, such as yellowfin and big-eyed tuna. D - 6-hook "Standard" basket used in most of POFI's experimental fishing.

2.15

Long stride forward in the quest for better fish quality is the Fisheries Research Board's system of carrying fish on boats in refrigerated sea water. Last year tests the 60-foot "J.R.D." proved feasibility of brine tanks on large vessels. Salmon are unloaded from starboard tank, and port tank trunk cover is open ready for unloading. Scientists say transfer of fish on and off boats is "essence of simplicity."



2.6 THREE POINT PROGRAM AIDS FRESH FISH SALES

Newsome, Hal M.
Southern Fisherman 16, 29-30, 36 (January 1956)

By stressing the three basic points of variety, freshness control, and personal service, a South Florida supermarket organization has become one of the most successful retail distributors of fresh seafoods in the area.

A staff of 130 seafoodmen and fishery experts handle all stages of distribution in the stores. The company features a constant supply of large quantities of fresh seafoods obtained locally, and in nearby areas.

In these stores, fresh seafood items are personally serviced over the counter by white clad seafoodmen. The volume of fresh fish sold in this way is approximately 4 times that of frozen packaged and canned seafoods. This ratio between fresh and frozen volume is believed to be the opposite in other southern chain outlets. Such a successful promotion is considered a very hopeful sign for the fresh seafood industry as self-service frozen seafood items had nearly forced fresh fish off the market.

Experienced seafood dealers believe that food stores carrying both fresh and frozen fish and shellfish items will sell more than an organization that sells only one type. The percentage of profit per item is usually higher in frozen items, but the gross profit on fresh fish is often higher as a larger volume can usually be sold if the fresh items are properly varied and presented. A balanced promotion of fresh and frozen items seems to be the answer to successful and profitable merchandising.

The planning of fresh seafood distribution in these stores is very thorough. The supervisors call on every store several times a week to consult with the individual seafood countermen. Attention is given to improving personal service over the counter, as the firm believes this is important for

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 ABSTRACTER: Lois Elgin

3.237 DEEP-FAT FRYING TECHNOLOGY KNOW-HOW IS NECESSARY FOR PREPARED FOODS EXPANSION

Quammen, W. A.
Frosted Food Field 22, 81, 85, 88 (January 1956)

An understanding of the technical aspects of the deep fat frying process is increasingly important to produce the best foods from a standpoint of quality. The fundamentals of a good frying operation include: (1) proper preparation of the food, (2) good frying techniques, and (3) care of frying fat.

A few general principles that apply to preparing most food for the frying kettle include: (1) the removal of excess moisture, either due to washing of the food itself or from the batter, (2) the use of the proper kind and amount of batter when this is required, (3) coating with the right amount of bread crumbs, (4) the removal of excess crumbs, (5) sorting the foods so that uniform pieces can be fried in fat at the same time.

During the frying operation, care must be exercised so that the finished food has: (1) the right appearance from a color standpoint, (2) the correct degree of cook, (3) the proper amount of fat absorption.

Frying fats used commercially include both hydrogenated fats and vegetable oils, chief of which is cottonseed oil. Hydrogenation results in a frying fat with a maximum frying life, including stability of the oil itself and a greater resistance to rancidity of the foods which have been fried in the fat. Certain fryers prefer oils i.e., cottonseed, peanut or corn. Some feel that oils produce a better flavored product, that an oily finished appearance is preferred, that there is greater convenience in handling oils or simply because of a lower per pound cost of some oils.

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 ABSTRACTER: Thelma S. Rose

2.8 SERVING SUCCESSFUL SEAFOOD

MacFarlane, Alberta
Institutions 38, 98-119 (January 1956)

The United States has 160 species of edible fish on the market that can be prepared in many different ways.

New methods of sharp freezing, processing and distribution of frozen fish maintain the quality, appearance, and food value of freshly caught fish. Fish that is properly frozen and wrapped keeps in perfect condition a considerable time at -10° F. or lower.

Other fish are packed in ice immediately after being caught. Shipped in refrigerated cars, they can be served a short time after leaving the water.

All types of fish are rich in high quality, easily digested protein and essential vitamins and minerals. A chart shows the composition of fish in detail.

The purchasing and care of fish takes thought because it is one of the most delicate and perishable foods. Nothing less than the best quality, not necessarily the most expensive, will satisfy customers. Once purchased, the fish must be kept refrigerated until preparation time.

The market forms of fish include whole or round fish, drawn fish, dressed fish, steaks, fillets, and fish sticks.

Very fresh fish have bright, full eyes that are never sunken. The gills are a reddish pink

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 ABSTRACTER: Lois Elgin

3.8 SALTED HERRINGS, ETC. - SUGAR CURED

Nikkilä, O. E. In verdorbenen Heringpräserven vorkommende Bakterien - Arten und ihr Verhalten 1955 gegenüber Salz und Konservierungsmitteln [Types Of Bacteria Found In Spoiled Herring Preserves And Their Tolerance Of Salt And Preservatives]. Fette, Seifen, Anstrichmittel (Industrieverlag Hernhaussen K-G., Hamburg, W. Germany), Vol. 57, No. 7, p. 494, 1955. 5 pp. In German.
World Fisheries Abstracts 7, 39 (January-February 1956)

The sugar cured herring of the Scandinavian type is a semi-preserved product and is cured in a bath containing 10 to 12 percent salt and 2 to 6 percent sugar. After curing, the fish are filleted, skinned and packed in tin cans or glass containers with a sauce containing 7 to 12 percent salt, 8 to 15 percent sugar and if required spices. The pH is adjusted to about 5 by acetic, citric or lactic acids. Preservatives such as benzoic acid and derivatives, boric acid, hexamethylenetetramine, etc., are added to extend the keeping quality. As the product is not sterilized, the bacterial and enzymic activity continue to cause alterations in the aroma and the structure of the flesh. Spoiled samples of the herring preserves were employed to isolate 19 types of bacteria which were classified under the genus Micrococcus, Sarcina, Achromobacter, Flavobacterium, and Corynebacterium. The bacteria were found to have a wide range of salt tolerance which may partly be due to adaptation during long storage. The bacteriostatic effects of hexamethylenetetramine, propyl and methyl ester of p-hydroxybenzoic acid, sodium benzoate, benzoic acid, and boric acid were high at pH 5.5, hexamethylenetetramine and propyl ester of p-hydroxybenzoic acid being most effective and boric acid being less effective. At a concentration of 0.01 percent hexamethylenetetramine was effective on all types of bacteria investigated whereas 0.3 percent boric acid was effective on only some types of bacteria.

 ABSTRACTER: G. N. Subba Rao

SELLING FRESH FISH

FISH FOR RESTAURANTS

DEEP FRYING TECHNIQUE

PICKLED FISH SPOILAGE

2.8

and are free from slime and odor. The scales are bright, shiny, and adhere closely to the skin. The flesh is moist, firm, elastic, and does not separate from the bone.

Frozen fish should be kept in the sharp freezer until used. Fillets, steaks and dressed fish may be cooked without defrosting, but more time is needed. Refrigerator temperature should be 40° to 45° while fish is defrosting. Defrosting period should only be long enough to permit ease in preparation.

Methods of fish cookery include frying, broiling, pan frying, steaming, baking, boiling and poaching. Fish in quantity food operations is frequently fried. Maintaining the quality of the frying fat in of utmost importance as the off-flavors will be transferred to the fish. The temperature of the fat varies from 350° to 375° F. Fish should not be overcooked as the delicate flavor and texture may be destroyed.

Of the various types of shellfish, shrimp is the most popular in the United States. Frozen, breaded, uncooked shrimp have proved to be very important to the quantity food operator.

Purchasing information is also given for lobster, crab, scallops, clams and oysters. Twelve recipes for shellfish from various restaurants in the United States are also included.

Various species of fresh and salt water fish are briefly discussed. Seventeen recipes using these fish are given.

At the end of the article there is a summary of fish cookery suggestions.

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2.6

continued sales. Personal services to the customer include cutting, skinning, boning, slicing, and dressing the fish to the customer's specifications. The countermen are carefully chosen and trained. Store managers believe that satisfied fish customers will, by word-of-mouth advertising, boost general store traffic and sell other food items as well.

Lasting good-will is also created by the company's efforts to supply traditional varieties of seafoods for the religious holidays of all groups.

With 49 stores in the area, the organization has flexibility in distribution. They find that certain varieties move better in individual neighborhoods.

Deliveries are made to the largest stores at least 3 times a week, and twice to all locations. The deliveries are staggered on different days to keep trucking costs down and seafood quality up. Real sale prices are placed on items after 1 or 2 days to move them quickly. Excellent freshness control is also maintained by regularly iced "wet" cases.

Some practices are necessary to sell fresh seafood: grading shipments carefully, enforcing pre-chilling and non-crushing from the boat level on, and better packing, boxing and icing in transit.

Each store has its own storage and handling facilities concealed near the seafood counter. The unloading platforms, hand trucks, scales, benches, and cooling rooms are arranged to speed up handling and cut costs. Plenty of flake ice for display and storage purposes is available from ice machines found in every store. Warehouses are provided with the latest sanitary and labor saving equipment for cutting and preparing the product.

Newspaper ads on seafoods are run twice a week. Special displays are made of these items.

This resourceful merchandiser has capitalized on a potential demand not satisfied by other retailers.

3.237

Most commercially fried foods are fried at 340° to 390° F. and a wide variation in absorption of fat can occur in different foods. In frozen fried fish, the amount of absorbed fat is relatively small --about 10 percent. Good control over frying time and temperature and amount of batter on food surface is important to effect proper fat absorption. Excessive absorption is not only costly, but may be greasy and unappetizing.

In the case of frying fat, these are some of the factors which reduce the life of a fat: (1) excessive heating, (2) localized overheating, (3) metal contamination, (4) soaps and caustic residue left after kettle washing, (5) burnt food particles, (6) inadequate filtering of frying fat, (7) insufficient fat turnover.

3.237 STICKS THAT DON'T STICK

Anonymous
Modern Packaging 29, 190, 191 (March 1956)

A rigid foil tray with lengthwise corrugations on the bottom is being used to package fish sticks. The sticks are laid crosswise of the corrugations one layer deep. The container is closed with a crimped-in paperboard cover.

The main advantage of this container for fish sticks is that the product can be heated and served in the original carton. The corrugations hold the sticks off the bottom of the container and prevent sticking and burning.

The fish stick company first tested a regular flat-bottom-style rigid foil container. When heated in this container, localized overheating occurred where the sticks were in direct contact with the foil and caused blackening of the product. The addition of corrugations of the proper depth and spacing overcame this objection.

In the fish stick plant, the finished fish sticks, as they emerge from the cooking process, are grouped and placed manually in the trays. The lids are then placed in position and the filled packages are conveyed through the automatic closing machine which folds and crimps the upturned edge of the tray, turning out 30 to 35 finished packages per minute.

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COMMERCIAL FISHERIES ABSTRACTS VOL IX NO. 8 PAGE 9
UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE ABSTRACTER: Kathryn L. Osterhaug

3.249 FREEZING, PACKAGING, AND FROZEN STORAGE OF FISH

Nikkila, Olavi E., and Linko, Reino R. (Central Laboratory of Tukkukauppojen Oy, Turku, Finland)
Food Research 21, 42-46 (January-February 1956)

Methods.—Baltic herring, whole or in fillets were packed in wax cartons, frozen in a freezer with forced air circulation or in a metal contact freezer at -35° C., stored at -20° C., defrosted at suitable intervals in pliofilm bags at room temperature, and examined for quality by determining the extent of myosin denaturation.

Results.--Glazed fish frozen whole remained in good condition for longer periods of time than unglazed fish. The glazed fish kept better without air circulation than with circulation. No desiccation was detected; (2) glazed frozen whole fish kept better in aluminum foil-lined cases than in unlined cases; (3) both fillets and whole fish frozen in a contact freezer kept longer than those frozen in an air blast. The fillets and whole fish deteriorated at about the same rate; (4) fish frozen before or during rigor mortis deteriorated much faster than samples frozen after the resolution of rigor mortis.

Discussion.--Fluctuations in temperature during storage tend to cause the formation of large ice crystals and thus eliminate the advantages of quick freezing. Changes during storage include: (1) denaturation of the protein, (2) dehydration, and (3) oxidation. The control of humidity is very important when fish are stored with only a light ice glaze. Denaturation during storage eventually renders the myosin completely insoluble and this gives a basis for estimating the loss in quality of frozen fish. Denaturation is most strongly affected by an increase in temperature, and to lesser extents by the packaging, freezing, and circulation methods employed. Refreezing produces a marked increase in denaturation.

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COMMERCIAL FISHERIES ABSTRACTS VOL IX NO. 8 PAGE 9
UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE ABSTRACTER: Claude Thurston

3.237 OVERHEATING, CLEANLINESS, FAT TURNOVER MUST BE WATCHED IN CONTINUOUS FRYERS

Kennedy, Richard
Frosted Food Field 22, 55, 139 (January 1956)

The fish stick is an example underlining the need for packers to replace slow manual breading and frying with modern continuous processing to keep pace with growing demand for precooked convenience foods.

The following suggested techniques and operating practices help solve major problems which stand in the way of precooked foods on a continuous basis, with greater output at lower cost.

Continuous fryers built to capacities up to 2,000 pounds of finished product per hour show that crumbs and food particles are constantly introduced into oil and build up to forbidding proportions. Studies of frying oils confirm that crumbs and foreign matter cause residual carbon deposits and free fatty acids that contaminate both old and new oil. The use of a 2-stage system continuous filter helps. First, a rotating screen filter removes particles down to 210 microns; second, a roller-fed paper element, removes particles down to 15 microns.

Too much heat causes accelerated breakdown, rancidity, and darkening of cooking fats and oils. Prevention of oil overheating is simplified in fryers maintaining a rapid velocity of oil sweeping over a large heat transfer area so that no "hot spots" are permitted. Oxidation of cooking oil due to aeration can be avoided by not allowing oil to cascade over a high fall or agitate in a manner to incorporate air.

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COMMERCIAL FISHERIES ABSTRACTS VOL IX NO. 8 PAGE 9
UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE ABSTRACTER: Thelma S. Rose

6.134 REDUCTION OF FISHERY PRODUCTS, METHODS AND EQUIPMENT STICKWATER TREATMENT

Lewis, A. M., Solheim, P.
World Fisheries Abstracts 7, 45 (January-February 1956)

(a) Stickwater concentrate dried on twin drum, atmospheric, sump-type roller driers has been considered in preliminary investigations with reference to the mixing of the roller-dried powder with fish meal to form wholemeal and the marketing of the stickwater powder as such. The following aspects are dealt with: hygroscopicity, packaging, and vitamin B_{12} content. It is concluded that: (1) the most valuable vitamin present in stickwater is B_{12}, but that 25 percent is destroyed in roller-drying; (2) both roller-dried stickwater powder and wholemeal containing the powder should be packed in moisture-proof containers; (3) if a fish meal manufacturer desires to produce wholemeal, but cannot sacrifice raw fish capacity in order to handle the concentrate, then, as the largest roller-drier at present available has a capacity of only 60 percent of a plant handling 10 tons of raw fish/hr., the installation of a small extra fish meal drier of conventional type would be more economical than the provision of 2 more roller-driers; (4) provided a stable product is manufactured, it is better to market concentrate in drums instead of roller-drier material, and it is hoped that the extra cost of acidifying may be avoided by concentrating to 65 percent total solids, at which concentration a more stable product will be obtained. There are 2 tables which show the equilibrium moisture content of the various products, and the vitamin B_{12} content and losses in concentrate and roller-dried powders. The equilibrium moisture contents at 40 percent and 76 percent relative humidity, resp., of the fish meals, and dried stickwater in the form of a powder are as follows: pilchard meal, 6.3 percent and 10.6 percent; wholemeal made from pilchard meal and powdered dried stickwater, 5.9 to 6.8 percent and 13.7 to 15.1 percent; roller-dried powder, 7.0 to 7.5 percent, and 26.5 to 35 percent. The vitamin B_{12} contents on a dry basis are as follows: (1) stickwater concentrate from a triple effect

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COMMERCIAL FISHERIES ABSTRACTS VOL. IX NO. 8 PAGE 9
UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE. Reprinted in whole

FISH STICK CONTAINERS

CONTINUOUS FRYER CONTROL

FROZEN STORAGE OF FISH

STICKWATER TREATMENT

3.237

The smallest possible amount of oil in the frying system is a requirement for optimum oil life because the heating of cooking oil causes deterioration regardless of how clean the oil is kept. A definite balance between new oil and oil being absorbed in cooking is, therefore, required.

A temperature control system which maintains an oil temperature within 2° F. of the desired temperature where the product enters the oil is important.

Good housekeeping is important to all fryers performance and cannot be over emphasized.

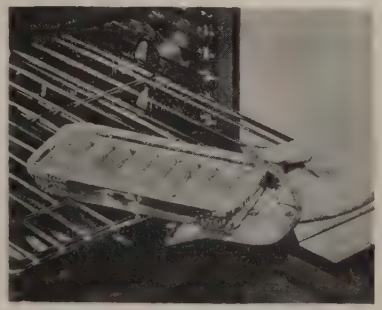
6.134

vacuum evaporator, 124.3%; (ii) roller-dried powder from (i), (80 pound/sq. in. [5.6 kg./cm^2] pressure and 6 sec. contact.), 80.1%. Loss during roller-drying, 36 percent; (iii) roller-dried powder from (i) (25 pound/sq. in. [1.8 kg./cm^2] 133 sec. contact), 95.8%. Loss during roller-drying 23 percent; (iv) stickwater concentrate from quadruple effect vacuum evaporator, 112.6%; (v) roller-dried powder from (iv), (78 pound/sq. in. [5.5 kg./cm^2] and 7 sec. contact), 92.6%. Loss, during roller-drying, 18 percent.

(b) Stickwater contains up to 20 percent of the total dry material in fish and its utilization presents problems because it cannot be stored as it is quickly decomposed by bacteria. It contains 90 to 95 percent water which means that for each 300 hl. (7,920 gal.) herring, the quantity of stickwater would be 150 to 190 hl. (3,960 to 5,020 gal.). Among the methods for utilizing stickwater for production of wholemeal are the Nygaard method in which herring are partially dried during the earlier part of the process, the Lysound method, in which stickwater is mixed with the press cake, and the newer method in which the stickwater is concentrated to 35 to 50 percent dry matter before mixing with press cake. The basic principles of one-stage, 2-stage and multiple stage evaporators for stickwater are discussed In the 2-stage or multiple-stage apparatus steam is supplied to the first stage only and steam produced by evaporation of stickwater is used to heat partially concentrated stickwater in later stages under vacuum. The fuel costs and design of a stickwater recovery plant are discussed. There must be rapid circulation of the stickwater through the pipes in which it is concentrated, to prevent incrustation.

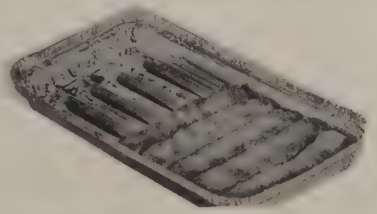
(c) This is similar to the article abstracted in WFA, November/December 1954 p. 43, under the codes: FWS 6.134, FISH SOLUBLES - MANUFACTURE, UDC. 664.957.9.

3.237 (Cross Reference: 3.238)



Added strength provided by corrugated bottom makes the 0.0035-in. foil pan sufficiently rigid to handle readily in and out of oven and to stack securely in the store.

Construction detail is shown by this view of base. Simple change in forming die was all that was needed to produce this feature. Ridges on which sticks **rest inside pan are 7/8 in. apart.**



Corrugations in rigid foil base keep fish sticks off bottom, permit even, crisp heating with no burning or sticking.

3.249

Conclusions.--The best quality of product is obtained by the following procedures: (1) packaging to eliminate air spaces, (2) careful glazing to protect from the atmosphere, (3) quick freezing under pressure in a contact-type freezer, (4) maintaining a constant storage temperature, (5) avoiding mechanical air circulation, and (6) freezing the fish fresh, but after it has passed the rigor mortis stage.

3.26 PORTION CONTROL FISH - REVOLUTION IN THE INSTITUTIONAL KITCHEN

Mathews, Martin
Quick Frozen Foods 18, 78, 84 (April 1956)

Portion-controlled meats and jellies and jams are typical examples of what is being purchased by cost-conscious institutional buyers.

Frozen-seafood packers have also been responding to the revolution. Some are grading fillets to size and weight for individual portions and others are pushing exact portion packs fabricated from fillets.

Restaurants are beginning to respond to this "new look" in seafoods. Progress is slow, restaurant operators have not been adequately informed about the new products designed for their convenience.

In regard to the market potential for all frozen fish and specifically for portion-cut fish, a recent Fish and Wildlife Service survey reports that 16.8 percent of all restaurants, 74.8 percent of all drug and luncheonette types and 65 percent of all lunch counters and refreshment stands in the United States, serve no fish.

In 1954 the National Restaurant Association reported that restaurants were using frozen seafoods on the following basis:

fish fillets	60 percent	Green shrimp	69 percent
fish sticks	18 "	breaded shrimp	27 "

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 ABSTRACTER: Kathryn L. Osterhaug

3.33 REDUCTION OF CURD IN CANNED SALMON PREPARED FROM FROZEN FISH PART II. - THE EFFECT OF pH AND SALT CONTENT

Seagran, Harry L. (Fishery Products Laboratory, Ketchikan, Alaska)
Commercial Fisheries Review 18, 1-4 (January 1956)

One of the most undesirable characteristics of salmon canned from fish that has been frozen and thawed is the appearance of a surface curd formation. The curd consists of coagulated soluble proteins that are released during heat processing.

It has been found possible to reduce curd formation by treating the thawed fish for 10 minutes prior to heat processing with a 70 percent saturated brine.

Tanikawa et al.(1952) suggested that the reduction of curd formed during the heat processing of brined fish flesh is due to the dissolving action of the brine on the flesh proteins. They suggest as complete a removal of soluble proteins from the surface of the flesh as possible in order to prevent the formation of curd.

It is also known that brine treatment of fish prior to freezing or after thawing markedly reduces drip, thus preventing the excessive loss of soluble proteins. Tarr (1942) has demonstrated that the prevention of drip in fish muscle by brining is due largely to the ability of NaCl to cause the proteins to bind liquid firmly.

In an attempt to explain the effect of brine on fish flesh in reducing drip and curd formation, the general proposals of Tanikawa and Tarr have been considered.

Red king salmon were used in experiments to measure the effect of NaCl concentration on protein solubility, imbibition, and curd reduction.

Thin slices of fresh and thawed frozen salmon flesh were weighed and then immersed for 16 hours at 68° F. in 100 ml. brine solutions ranging in salt concentration from 0 to 26 percent by weight. Loss or gain of weight was measured by weighing the blotted slices. Total soluble nitrogen determinations

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 ABSTRACTER: Kathryn L. Osterhaug

3.237 CLARIFIES OIL QUICKLY TO UP FRY QUALITY

Bloomberg, Ray
Food Engineering 28, 86 (March 1956)

Vegetable oils require frequent clarification when they are used for frying foods. Clarification of the oil accomplishes the removal of food particles and helps to keep the free fatty acid content of the oil at a low level so that the quality of the fried food is retained.

Oil clarification at a Zillah, Washington, plant, which produces frozen fried potatoes, formerly required up to 2 hours. With the installation of a gyratory separator, shown below, clarification time was reduced from 2 hours to 18 minutes per 2,500 gallons of oil.

The gyratory separator screens oil at the rate of 140 gallons per minute through a 200-mesh metal screen cloth with 1.1129 inch openings. Stainless steel of market grade was used to fabricate the screen, whereas 316 grade stainless metal has been used to make the other parts of the separator. The separator is self-cleaning when in operation.

When oil clarification is required, the 300° F. frying oil is pumped to the gyratory separator installed atop the oil storage tank, clarified, and returned by gravity to the fryer or put into the storage tank as is necessary during general cleanup periods.

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 ABSTRACTER: Martin Heerdt

6.3 THE STRUCTURE OF LAMINARIN: ISOLATION OF A NON-REDUCING TRISACCHARIDE

Peat, Stanley; Whelan, W. J.; Lawley, H. G. and Evans, J. M. (University College of North Wales, Bangor)
The Biochemical Journal 61, p. x (September 1955)

Peat, Whelan & Lawley (1955) reported the presence of mannitol in the 'insoluble' and 'soluble' forms of the seaweed polysaccharide laminarin, previously thought to contain only glucose. Fractionation of a partial acid hydrolysate of insoluble laminarin (137 g.) gave mannitol and 1-O-β-D-glucopyranosyl-D-mannitol (crystalline benzoate, m.p. 88-94°; $[\alpha]D$ +39.1° in $CHCl_3$) as components of the mono- and di-saccharide fractions. The latter compound has also been obtained from soluble laminarin.

We now report the isolation of a non-reducing trisaccharide (approx. 1.1 g.) from the same hydrolysate. Qualitative examination of the products of partial acid and enzymic (β-glucosidase) hydrolysis indicated this substance to be 3-O-β-D-glucopyranosyl-O-β-D-glucopyranosyl-D-mannitol (1-O-β-laminaribiosylmannitol). Confirmation of this structure is provided by the following evidence:

(1) Mannitol content. 0.98 mol. prop. mannitol (measured by an unpublished method).

(2) Periodate oxidation. Oxidized at 15° with sodium metaperiodate, the trisaccharide consumed 6.08 mol. prop. periodate and yielded 3.72 mol. prop. formic acid and 1.03 mol. prop. formaldehyde. Calculated values are 6.0, 4.0 and 1.0 mol. prop., respectively.

(3) Synthesis. The trisaccharide has been synthesized by the following sequence of reactions: hepta-O-acetyl-α-laminaribiosyl bromide + 1:2:3:4-tetra-O-acetyl-β-D-mannose → undeca-O-acetyl-6-O-β-laminaribiosyl-β-D-mannose

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PORTION CONTROL FISH

FRYING OIL CLARIFICATION

CURD IN CANNED SALMON

NON-REDUCING SUGAR FROM LAMINARIN

3.237

Gyratory separator screens frying oil at 140-gpm. rate, is self-cleaning.

6.3

(1) De-acetylation
(2) $NaBH_4$
→ 1-O-β-laminaribiosylmannitol.

The snythetic and laminarin-derived compounds respectively show $[\alpha]D$-24.3° and-24.8° in water. Each gives a crystalline dodeca-acetate, m.p. and mixed m.p., 144-145° (uncorr.); $[\alpha]_D^{20}$ -17.9° and -18.6° in $CHCl_3$, respectively. (Found: acetyl, 51.4. Calc. for $C_{42}H_{58}O_{28}$, 51.1 percent.)

Only trace amounts of other mannitol-containing trisaccharides have been detected in the laminarin hydrolysate. In particular, less than 40 mg. of 1:6-di-O-β-glucosylmannitol was obtained. (This compound, together with 1-O-β-glucosylmannitol, was found by Lindberg (1953) in an aqueous extract of Fucus vesiculosus.) We therefore conclude that in those laminarin molecules which contain mannitol the hexitol residues are mainly, if not exclusively, located at the chain ends.

3.26

Usage has probably increased by at least 10 percent since these figures were reported.

The frozen fish fillet is still the preferred product and is reportedly replacing fresh fillets in all markets other than those located in coastal cities.

The bulk of the new portion-cut fish are fabricated in four-ounce portions, packaged in five-pound packages. They are packed either breaded or unbreaded and are at present uncooked.

Many small restaurants in the middlewest are using the four-ounce portion-control pack. Many of these restaurants had not previously featured seafoods. Today they feature them on their menus every day of the week.

The frozen seafood industry must stress quality, convenience, flavor and tenderness in its products if restaurants are to handle them on a continuing mass basis.

Typical examples of the neat precise appearance of precut portion-control servings is shown in the above display. Such servings reduce labor costs to a minimum and make it possible for the institutional server to figure his serving costs to the fraction of a cent.

3.33

were made on the resultant brines and NaCl determinations were made on the brined fish samples. A portion of each slice of brined salmon was heated in an oven for 2 minutes at 450° F. along with unbrined controls to determine the effect of the brine on curd formation.

As can be seen from the accompanying table, when the brine concentration was between 1 and 5 percent there was essentially no curd formation. Above these concentrations an increasing amount of curd was formed up to a maximum at from 17 to 20 percent brine concentration. The fresh tissue showed no significant curd on heating regardless of the NaCl concentration.

A second study was made to investigate the effect of pH and NaCl on imbibition and curd reduction. In this study a series of 40 gram samples of thawed minced salmon per 200 ml. of water or 3 percent brine at adjusted pH levels was held in 250 ml. centrifuge bottles for 16 hours at 36° F. The suspensions were centrifuged at 2,000 r.p.m. for 20 minutes, the supernatant liquid decanted and the change in weight of the samples noted. The fish samples were then sealed in 1/2 pound flat cans and processed at 10 to 12 pounds pressure for 40 minutes. The processed cakes were drained, reweighed, and inspected for curd.

The results of the second study indicated that in the absence of NaCl, minimum imbibition was from pH 5.2 to 6.3. At approximately pH 5.5 and below no curd was formed on heat processing.

In the presence of 3 percent brine, imbibition was at a minimum below pH 5 and on heat processing there was no curd below pH 5.

Thus, the retention of extra-cellular fluids or drip is related to the power of the proteins to imbibe free liquid. This imbibing power of muscle proteins is influenced by salt content and pH and exhibits a zone of minimum effect corresponding to the "isoelectric zone" of fish muscle proteins. The retention of fluid on processing, with corresponding curd reduction, depends on the liquid-binding power of the proteins at about pH 6.5 and above, occasioned by the presence of from 2 to 5 percent salt in the flesh.

Relationship of Brine Concentration to Curd Formation on Fresh and Thawed King Salmon Slices Immersed in Brine and Then Heated

Sample	Amount[1/] of Curd on Control	Amount of Curd on Brined Slices — Brine Concentrations--Percent										
		0	1	3	5	7	9	11	14	17	20	23	26
Fresh	+	0	0	0	0	0	0	0	0	0	0	0	0
Thawed	+	0	0	0	0	0	0	0	0	+	++	++	0
		0	+	0	0	0	+	+	+	++	++	++	0

[1/] 0 - little or none; + - moderate; ++ - excessive

5.0 THE VITAMINS - 1

Robinson, F. A. (Allen and Hanburys Ltd., Ware, Herts, England)
Food Manufacture 31, 63-65 (February 1956)

COMPLEXITY OF VITAMIN A.--Isomers which have been synthesized and assayed have potencies in units per gram as follows: acetates of 2-mono-cis 2,190,000, 6-mono-cis 634,000, 2:6-di-cis 688,000, 2:4-di-cis 679,000; aldehydes of all-trans 3,070,000, 2-mono-cis 3,070,000, 2:6-di-cis 581,000, 6-mono-cis 637,000; neo-retinene b, characterized as the 2:4-di-cis isomer 1,610,000. The new anhydro Vitamin A is an ethoxy anhydro Vitamin A_2 and has been formed from and converted to it through a retinene intermediate. The assay of neo-Vitamin A, all-trans vitamin A, and vitamin A_2 in fish liver oils have been separately determined spectrophotometrically after separation on columns of di-calcium phosphate 30 to 60 centimeters long. A new method for estimating vitamin A in margarine is also described.

CAROTENE CONVERSION TO VITAMIN A.--Antioxidants such as alpha-tocopheryl acetate interfere with carotene conversion by suppressing the oxidative processes causing the enzymatic conversion of carotene to Vitamin A. The anterior pituitary hormone may promote the conversion since it increased the vitamin content in cows milk. Aureomycin increased the response of rats to Vitamin A.

ERGOSTEROL IRRADIATION.--It is thought that irradiation of ergosterol gives procalciferol, which is converted to calciferol by gentle warming. Ergocalciferol, 4:4-dimethyl-calciferol, and several Vitamin D salts have been prepared. Dihydrotachysterol proved superior to calciferol in controlling calcium levels in rats. Further experiments with rats showed that the hydrolysis of phytic acid was promoted by lowering the calcium and increasing the vitamin D content of their food.

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 ABSTRACTER: Claude Thurston

6.192 DIFFERENTIATION OF UNIDENTIFIED CHICK GROWTH FACTORS IN LIVER

Edwards, H. M., Jr.; Chin, Donald; Norris, L. C. and Heuser, G. F.
The Journal of Nutrition 57, 329-343 (November 10, 1955)

The results of work presented in this report provide further evidence of the existence of unknown chick-growth factors. The purified diet used for the basal diet was shown to be complete in the known nutrients needed by chicks. However, the addition of dried liver or fish solubles resulted in an increase of approximately 20 percent in chick growth. The combination of dried liver and fish solubles gave an increase of 35 percent. The experimental work indicated that the additional increase in growth observed when the products were fed together was due to the existence of at least two unidentified growth factors, one present in dried liver and the other in fish solubles.

A study was made of the following liver fractions: (1) liver concentrate, (2) liver residue, (3) liver fraction 1, and (4) liver fraction 2. The liver concentrate was prepared from ground fresh liver by extraction with water followed by concentration. The extracted material was the liver residue. The liver concentrate was extracted with 70 percent ethanol and concentrated to obtain liver fraction 1. The ethanol insoluble residue was liver fraction 2. When the fractions were fed to chicks, the liver residue was inactive. Liver fraction 1 was much more active than liver fraction 2.

After liver fraction 1 was shown to be highly active, the solids content was reduced by extracting with phenol dissolved in ether. The phenol soluble fraction gave a marked increase in chick growth while the phenol-insoluble fraction was inactive. The phenol-soluble fraction was subjected to further fractionation using Craig's counter-current distribution procedure. The upper layer of the system was 50 percent phenol and 50 percent n-butanol, and the lower layer was distilled water containing 3 per-

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 ABSTRACTER: Neva L. Karrick

6.192 UNIDENTIFIED GROWTH FACTORS FOR CHICKS

Anonymous
Nutrition Reviews 14, 75-79 (March 1956)

This article reviews studies on unidentified factors. At least two organic factors are recognized as being needed by the chick. The factors have been reported in materials such as dried whey, dried liver, fish by-products, yeast, distiller's solubles, wheat bran, and forage products. Recently evidence has been published that a part of the growth-promoting activity of these crude materials is due to unidentified mineral constituents.

An improved assay for at least two of the unknown growth factors in whey, liver, and fish products was obtained when arsanilic acid was added in a corn-soybean ration and when 0.03 percent iodinated casein was added and sucrose was substituted for glucose in purified diets containing isolated soybean protein.

The addition of fish solubles, dried whey, or liver products resulted in a 10 to 15 percent gain in weight over that produced by the purified diet. Combinations of the materials gave no further increase in growth. However, the investigators did not leave the level of minerals recommended by the Committee on Animal Nutrition of the National Research Council.

An unidentified growth factor in fish solubles has been reported as concentrated one-hundred-fold by one group of workers and three-hundred-and fifty-fold by another. The factor was soluble in water, insoluble in ether, dialyzable, and stable to autoclaving at pH 2 through 11, but no pH 1.

The feeding of 30 percent dextrinized cornstarch in place of sucrose has resulted in increased

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 ABSTRACTER: Neva L. Karrick

6.54 POWDERED FISH PRODUCTION

British Patents 727,072
Food Manufacture 30, 262 (June 1955)

Many attempts to manufacture tasteless and odourless powdered fish on an industrial scale have not succeeded because of the failure to economically remove oils and fatty oxidisable substances from fish. This invention is claimed to provide an economical and practical method of powdering fish by subjecting fresh fish to extraction by boiling ethyl alcohol.

The process is carried out in three stages, drying between each.

1st Stage. Pulped fish is mixed and kneaded for about 45 min. with its own weight of acetone at 50° C. This dehydrates the pulp but with insufficient extraction of the lipins. Kneading is stopped, the liquid phase if separated, preferably under vacuum, and drying effected as much as is possible at this point.

2nd Stage. The dehydrated pulp is mixed with its own weight of 90 percent (by weight) ethyl alcohol and kneading is resumed. The mixture is heated to boiling point and continues to boil for about 45 min. until the fish tissues are completely disintegrated. Kneading is stopped and the liquid drained off, again under vacuum, until the tissues are completely dry.

3rd Stage. The mixture is made up again with a quantity of 90 percent (by weight) of ethyl alcohol equal to half the original volume of the fish. The mass is kneaded while being heated to boiling point, the heating being maintained for 1/2 hr. The liquid phase is drained off and the solid material dried. The fish is now quite dehydrated and free of lipins. Final drying is effected by sucking air through the mass at a temperature such that the alcohol still impregnating the material is carried

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VITAMINS FOR CHICKS

NEW GROWTH FACTORS

GROWTH FACTORS IN LIVER

POWDERED DRIED FISH

6.192

growth of chicks fed synthetic diets. This factor has been reported in liver, yeast, crude casein, and wheat bran.

Evidence has been presented that an unidentified factor is present in dehydrated green feed. It was also demonstrated that best growth responses were obtained in the presence of the fish factor, suggesting the need for two separate factors. A factor has also been found in purified proteins such as gelatin and casein.

"Vitamin B_{13}" has been used to describe a factor found in distiller's dried solubles. It may be related to orotic acid and/or to the factors in dried whey and alfalfa meal. Other growth factors have been reported in chick litter and in antibiotic residues, the mycelium meals.

Little progress has been made in the isolation of new organic growth factors for chicks. Improved assay procedures are needed. These should give consistent differences in growth greater than 30 to 50 g. at four weeks.

6.54

off, and the drying completed.

The particles of fish are passed through a combined grinder and sieve and reduced to powder form.

The liquid phases are distilled to yield acetone or ethyl alcohol at suitable degrees of purity on the one hand, and on the other, a mixture of water and oils which is subjected to decantation after separating the water from the oils. They can be used again for the extraction of more fish.

5.0 (Cross Reference: 6.194)

ROLE OF VITAMIN E. --The importance of Vitamin E in chick nutrition has been confirmed. Addition of alpha-tocopheryl acetate to an all-vegetable protein diet increased the hatchability of turkey eggs. Vitamin E appears (1) to act as an unsaturated fat antioxidant, in glycogen synthesis and in oxygen uptake brought about by alloxan, (2) to regulate turn-over rates of nucleic acids, and (3) to incorporate formate in nucleic acids and in protein.

FUNCTION AND ESTIMATION OF VITAMIN C. --A heat-stable, non-enzymatic factor in the insoluble portion of the liver has been shown to oxidize ascorbic acid to dehydroascorbic acid. This is further degraded by an enzyme system in the soluble portion of the liver. Ascorbic acid appears to affect the operation of the tricarboxylic acid cycle. New analytical methods are described which involve the use of N-bromosuccinimide with 1:2-naphthaquinone-4-sulphonate, also the determination of reduced, dehydro-, and total ascorbic acid by separation in a norite column and treatment with 2:4-dinitrophenylhydrazine and thiourea.

INTESTINAL SYNTHESIS OF VITAMINS. --Reports indicate that deficiencies in thiamine, riboflavin, nicotinic acid, and folic acid are more acute in germ free than in normal chicks. Their excreta contained enough of the vitamins to save their lives if injected orally but could not have been derived from intestinal bacteria.

OTHER ASSAY METHODS. --Several assay methods are listed which include: circular paper chromatography for thiamine, polarography for riboflavin, and paper electrophoresis for the separation of riboflavin and its derivatives.

6.192

cent glacial acetic acid at pH 2.5. Eight two-liter separatory funnels were used as the counter-current tubes. The phenol was removed and the material concentrated. A second counter-current distribution was then completed.

The contents of each tube were fed to different groups of chicks in separate experiments. The results showed that the original phenol extract contained at least two growth promoting factors, both of which are evidently different from the fish-solubles factor. One was 74 percent soluble in the phenol-butanol layer and the other 98 percent soluble in the water layer. One fraction was found in tubes 1, 2, 3 and the other in tubes 7, 8. It is possible that the growth response from tubes 7 and 8 was not due to organic matter, but rather to a mineral (s) not previously reported to be required by the chick.

7.0 RESEARCH BY THE NUMBERS

Anonymous
Chemical Week 78, 56 (March 31, 1956)

Specialists in the use of statistics to minimize the cost of research have a new tool--the Box method. This method was named for its originator, George E. P. Box of Manchester, England. The method is said to be simpler to use than are the older statistical methods and to be applicable to a wide range of chemical problems.

Essentially, the method consists of obtaining data at a few selected points in a research experiment. Then, using these results in a mathematical equation, the research worker plots one or more curves to obtain data equivalent to a great number of experiments. In determining the optimum conditions for synthesis of a new compound, for example, he may need to make only six experimental runs to determine the conditions--such as time, temperature, and pressure--for highest yield of the product.

The Box method can assist in finding two or more requirements, such as the highest yield at the highest parity. It can also contribute to a better understanding of the theoretical nature of the research project, disclosing variables not previously thought to be important.

The most serious limitation in the method is the potential size of error in the results it provides. Nevertheless, it is fast earning a permanent place in chemical research.

ABSTRACTER: F. Bruce Sanford

7.51 PURIFICATION AND CRYSTALLIZATION OF THE MYOGLOBIN OF SALT WATER FISH

Rossi-Fanelli, A. and Antonini, E. (University of Rome, Rome, Italy)
Archives of Biochemistry and Biophysics 58, 498-499 (October 1955)

Our knowledge of the chemical nature, physico-chemical properties, and physiological functions of the myoglobin of the lower vertebrates is very limited.

In this communication we wish to report the results of investigations which led to the isolation and crystallization of the muscle myoglobin present in some Scomberoid fishes belonging to the species Palamys sarda and Thunnus Thynnus.

The greatest difficulty in the purification of myoglobin is known to be in the separation of this pigment from the hemoglobin which is always present in the muscle. The usual methods for separating the two pigments have not proved satisfactory in this case due to the fact that the properties of the pigments of these animals differ from those of the pigments of the other animal species so far investigated.

For the purification crystallization of hemoglobin we have used the following procedure: Blood taken from the animal's (Palamys sarda) heart (atrial cavity) immediately after death was diluted at once by 2 volumes of 1 percent NaCl solution and centrifuged at 1000-1500 r. p. m. for 10 min. separating the red corpuscles which were repeatedly washed in a chloride solution and finally hemolyzed with an equal volume of distilled water. The extract was filtered upon addition of celite. The filtrate was then dialyzed at 0° C. against ammonium sulfate (70 percent saturation). After a 24-hr. dialysis the liquid was placed in a petri dish at 0° C. Four-five days later crystals of methemoglobin, forming

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7.522 EVALUATION OF AMINO ACIDS IN FISH PROCESSED BY VARIOUS METHODS

Proctor, B. E. and Lahiry, N. L. (Department of Food Technology, Massachusetts Institute of Technology, Cambridge)
Food Research 33, 91-92 (January-February 1956)

INTRODUCTION. --In view of the increasing popularity of processed fish this investigation was undertaken to determine whether commercial canning and dehydration have any destructive effects on the essential amino acids of shad and haddock.

PREPARATION. --Fresh fillets of shad meat were cut into strips 1/2 inch long by 1/8 inch square, and cooked 10 minutes under 5 pounds pressure. The strips were dipped in an ascorbic acid solution to prevent rancidity, preheated, and dried in a vacuum belt drier under carefully controlled conditions. Haddock samples were prepared in the same way except that the ascorbic acid treatment was omitted. To prepare canned samples the frozen shad was thawed, scaled, and eviscerated. Fillets were prepared after removing the head, tail, and fins. Following a 2 hour treatment in 60° salometer sodium chloride the fillets were packed by hand in No. 1 cans. Fresh haddock was scaled, eviscerated, and cooked 10 minutes in flowing steam. The muscle was flaked and packed by hand in No. 1 cans after adding 5 grams of sodium chloride per pound of flakes. The cans were exhausted for 40 minutes in flowing steam, sealed, and cooked 60 minutes under 10 pounds pressure.

ASSAY PROCEDURE. --The dehydrated fish were ethyl ether extracted, and the canned fish were vacuum dried and then subjected to microbiological assay for amino acid content using the method of Proctor and Lahiry (Food Research, p. 88 this issue).

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ABSTRACTER: Claude Thurston

7.522 THE MICROBIOLOGICAL DETERMINATION OF THE ESSENTIAL AMINO ACIDS IN FISH PROTEIN

Lahiry, N. L. and Proctor, B. E. (Department of Food Technology, Massachusetts Institute of Technology, Cambridge)
Food Research 33, 87-90 (January-February 1956)

PREPARATION AND COMPOSITION. --Fresh fillets of shad and haddock were ground in a Waring blender with small amounts of water added. Spread in thin layers on aluminum pans, the slurry was dried in a vacuum belt drier at 2 millimeters pressure and 15° F. The dried material was ground in a Wiley Mill, sieved, and stored in glass-stoppered bottles. Pomfret was vacuum dried in India and imported by air. The proximate composition was determined for moisture, ash, and protein on the ether-extracted samples, and fat on the powdered sample. The results obtained for percentage of moisture, ash, protein, and fat in the three types of fish were: shad-6.67, 5.4, 88.56, and 40.20; haddock - 7.91, 4.24, 90.31, 0.44; pomfret - 8.40, 8.05, 84.37, and 0.62.

AMINO ACID ASSAY. --The test organism used in all experiments was Leuconostoc mesenteroides P-60, culture number M. 8042 obtained from the American Type Culture Collection. Samples of the dried fish were hydrolyzed with hydrochloric acid in covered erlenmeyer flasks in an autoclave at 15 pounds pressure for 5 hours. After cooling and diluting, the contents of the flasks were transferred quantitatively thru filter paper to 100 milliliter volumetric flasks, diluted to the mark, mixed thoroughly, and preserved in amber bottles under refrigeration. For analyses aliquots of these solutions were adjusted for pH with sodium hydroxide and dilute to 100 milliliters. Tubes of the solution were autoclaved at 15 pounds pressure for 10 minutes, cooled, inoculated, and incubated 72 hours at 37° C. The contents of the tubes were titrated with 0.1 N sodium hydroxide using bromothymol blue as the indicator. The amount of amino acid was determined from a standard curve which

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ABSTRACTER: Claude Thurston

"BOX" METHOD OF RESEARCH

MYOGLOBIN FROM SALT WATER FISH

EFFECT OF FISH PROCESSING

AMINO ACID ASSAY

7.51

short rods, were observed.

Determinations of the solubility of hemoglobin in pure solution and of myoglobin present in salt water fish muscle extracts have shown that both pigments precipitate with ammonium sulfate of 75 percent saturation.

For the purification and crystallization of myoglobin we have adopted the following procedure: Muscle from the lateral line of the trunk, removed immediately after the death of the animal (Palamys sarda), was homogenized in equal volumes of distilled water; the pulp so obtained was allowed to stand at 0° C. for 4 hr. and then filtered. To the aqueous filtrate, ammonium sulfate was added until 65 percent saturation was reached; the solution was then allowed to stand for 1 hr. at 0° C. and filtered. The greatest part of the muscle proteins was thus eliminated while hemoglobin and myoglobin remained in solution. More ammonium sulfate was then added to the filtrate until 85-90 percent saturation was obtained and the extract filtered rapidly in vacuo at 0° C.; the brown precipitate was collected and redissolved in a minimum amount of distilled water and dialyzed against water until the ammonium sulfate had been completely removed. The fluid containing hemoglobin and myoglobin was then filtered and the pigments separated by continuous electrophoresis on paper as previously described.

The purified myoglobin which was thus obtained was dialyzed against a 65 percent saturated solution of ammonium sulfate for 24 hr. and placed in a petri dish at 0° C. After five-seven days small needle-shaped crystals were observed; successively larger crystals appeared.

Large star-shaped or cross-shaped myoglobin crystals were obtained applying this technique from the muscles of Thunnus thynnus.

In both cases the crystalline myoglobins proved to be electrophoretically homogeneous.

7.522 (Cross Reference: 2.9)

related the response of the organism to the amount of acid present. The percentage of each acid in each of the three types of fish were essentially the same, and compared favorably with the amounts found in pork and beef muscle.

CONCLUSIONS. --Since the nutritive value of proteins depends to a great extent on their lysine, methionine, and tryptophan content, and vegetable proteins are frequently deficient in them, these three fish (shad, haddock and pomfret) are excellent sources of protein in areas such as India were there is a shortage of protein foods but where deep sea fishing is available.

7.0 (Cross Reference: 0.6)

7.522 (Cross Reference: 8.51, 3.39, 3.6)

RESULTS AND CONCLUSIONS. --Identical results were obtained in triplicate for each of the 10 essential amino acids determined. The procedure was considered adequate. Data given in tables 1 and 2 show that the amino acid contents did not differ appreciably whether the fish were raw, dehydrated, or canned. Thus the common methods of processing apparently do not affect the amino acid content of the fish.

7.599 FREE SUGAR ESTIMATION IN CODLING (GADUS CALLARIAS) MUSCLE

Jones, N. R. (Torry Research Station, Aberdeen, Scotland)
The Biochemical Journal 62, 7P-8P (January 1956)

PROCEDURES.--A comparison of procedures reveals that: (1) reductometric techniques are unreliable and non-specific for codling muscle extracts of high free amino acid content; (2) direct quantitative paper chromatography is satisfactory for some species with high ribose content, but complicated by salt distortion in others; (3) freeze-dried and electrolytically desalted extracts give low recoveries due to 'browning' reactions; (4) strong base ion-exchange resins remove interfering salts but give low glucose recovery; (5) the resin mixture Dowex 2 plus IR-120(h) fails to remove taurine from ether extracted trichloroacetic acid extracts; (6) taurine interferes with reductometric but not chromatographic determinations; (7) the 1:1 mixture LR-120(H):LR-4B(OH) is effective in removing acids other than taurine and does not involve gas evolution.

EXPERIMENTAL DATA.--Using 2 grams of a 1:1 mixture of LR-120(H) and IR-4B(OH) with the separated extracts followed by chromatography in butanol-acetic acid solution and spot elution, 9 to 36 milligrams of glucose per 100 grams were determined in muscle from freshly killed line-caught or trawled codling. The levels dropped for samples stored in ice, reaching 0 to 6 milligrams per 100 grams after 19 days. Ribose increased from 0 to 4 milligrams at 12 days and then fell. Sterile muscle blocks stored at 0°C. in most cases gave only trace glucose values after 5 days. Ribose increased to 5.2 milligrams after 12 days and to 7.0 milligrams after 21 days. Glucose decrease appears to be retarded by bacterial action. Ribose is increased by muscle ribosidase action and later decreased by combined leaching and bacterial action.

 ABSTRACTER: Claude Thurston

7.80 ONE-TAILED AND TWO-TAILED TESTS IN ORGANOLEPTIC COMPARISONS

Roessler, E. B.; Baker, G. A.; and Amerine, M. A. (University of California, Davis, California)
Food Research 21, 117-121 (January-February 1956)

DEFINITION OF TERMS.--Tasters are selected on the basis of their acuity, or ability to detect the desired component an unusually large number of times. If the test involves distinguishing the presence of one constituent only it is one-sided or "one-tailed". If, however, it is based on telling which of two components is the stronger it is two sided or "two-tailed". While tasters are selected on the basis of a positive selection the negative response is also interesting from a statistical standpoint.

PURPOSE OF REPORT.--The object of the paper is to provide tables for paired-samples and triangular tests, and to indicate which tables are appropriate for the various cases.

DISCUSSION OF DATA.--Table 1*gives the number of agreeing judgments (two-tail) where $p=1/2$, and table 2** gives the number of correct answers (one-tail) where $p=1/6$ required for significance, where (p) is the probability of a correct guess. Where the number of tasters or tastings (n) is not given in the table the following formulas may be used: the observed number of agreeing judgments (two-tail) or correct answers (one-tail) must exceed $\frac{n}{6} + 0.5 + \frac{z\sqrt{5n}}{6}$ where the values of (z) at 5 percent, 1 percent, and 0.1 percent levels of significance are; 1.196, 2.576, and 3.921 for the (one-tailed) and 1.645, 2.326, and 3.090 for the (two-tailed). For the paired sample comparison the correct answers must exceed $\frac{n}{2} + 0.5 + \frac{z\sqrt{n}}{2}$ where (z) has the same values as above.

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 ABSTRACTER: Claude Thurston

7.83 IRON SULFIDE DISCOLORATION OF TUNA CANS
II. ANALYTICAL METHODS

Pigott, George M. and Stansby, M. E. (Fishery Technological Laboratory, Seattle, Washington)
Commercial Fisheries Review 18, 5-9 (February 1956)

Analytical methods, particularly for determination of sulfide in canned fish are described. A modification of Almy's method for sulfide sulfur (Journal of the American Chemical Society 47, 1381 (1925) was employed. Since a considerable proportion of the free sulfide sulfur occuring in canned tuna is present as hydrogen sulfide in the headspace, precautionary measures have to be taken to prevent loss when the can is first opened. This is done by placing 20 percent zinc acetate solution on the lid of the can, and then puncturing the can with a vacuum guage. This sucks the solution into the can and effectually prevents loss of any hydrogen sulfide which is retained as zinc sulfide.

The homogenized fish sample is suspended in water in the aeriating cylinder (c) using 25 grams in 50 ml of water. 30 ml of 2 percent zinc acetate are put in flask B and 20 ml in Volumetric flask A. The stoppers (lubricated with glycerine) are put in place and 50 ml of 6 N hydrochloric acid added from the dropping funnel leaving a few drops in the funnel to act as a seal. Carbon dioxide is bubbled through for 15 minutes. The solutions are combined in the volumetric flask and made to a volume of about 90 ml. 5 ml of 0.04 percent p aminodimethylaniline solution in 6N hydrochloric acid are added followed by 1 ml of 0.02N ferric chloride solution in 2.4N hydrochloric acid. A blue color develops slowly. After 1 hour or longer dilute to the 100 ml mark and read the color in a spectrophotometer at 745 millimicrons. Readings are converted to concentration of sulfide by running a calibration curve employing known amounts of standard sulfide solution.

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 ABSTRACTER: M. E. Stansby

7.80 ORGANOLEPTIC EVALUATION BY INDUSTRY PANELS--THE CUTTING BEE

Hinreiner, Elly (Department of Food Technology, University of California, Davis, California)
Food Technology 10, 203 (April 1956)

THE METHOD.--Ordinarily, about 70 to 80 samples are submitted for evaluation; these include a number of duplicates and "hold overs." (The latter are duplicates of some of the samples judged in the previous year's cutting bee. These samples are carefully stored at a cool temperature to minimize changes in flavor or other characteristics). All samples are purchased by impartial buyers in grocery stores in the Los Angeles and San Francisco areas. Types selected are divided among (a) whole, dark-ripe olives (40-50 samples), (b) pitted, dark-ripe olives (12-15 samples), and (c) green-ripe olives (12-15 samples). Each is scored for flavor, texture, and appearance with one exception. Green-ripe olives, due to the wide variation in opinion as to what this olive type should look like, are not judged for appearance; instead all samples are given the same score, the maximum being arbitrarily selected. Judges score the factor of flavor on an eleven-point scale; appearance and texture on six-point scales. They are asked to comment on the individual samples, particularly on those that they have graded down. The sum of the scores of the individual judges is then multiplied by a factor which gives a maximum possible score of 50 for flavor and 25 each for texture and appearance. For example, if four judges have scored a sample for flavor, the sum of their scores is multiplied by 5/4 to obtain the flavor score for that sample.

About 40 individuals are normally available as judges. Each is assigned to scoring a single characteristic in a single type of olive. Since flavor is considered most important, more judges are assigned to score this factor than either of the other two. Except for those judges rating appearance (who do not have to taste the samples) no one is asked to score more than 14 or at most 18 samples. This number is admittedly rather large for a single session, but the judges are allowed plenty of time

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FREE SUGAR IN COD MUSCLE

HYDROGEN SULFIDE DETERMINATION IN FISH

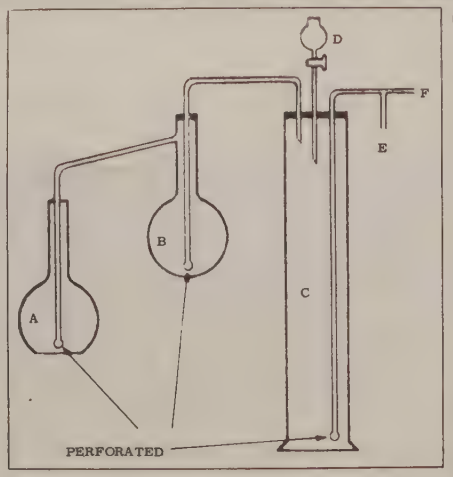
EVALUATING TASTE TESTS

ORGANOLEPTIC EVALUATION

7.83 (Cross Reference: 7.45)

APPARATUS:

A. 100-milliliter volumetric flask.
B. 80- to 100--milliliter round bottom distilling flask.
C. Aerating cylinder about 5 centimeters diameter and 38 centimeters high.
D. Dropping funnel of at least 60 milliliters capacity.
E. Manometer (water).
F. CO_2 cylinder.



7.80

(30 to 60 minutes) to register their evaluations. Since the judges are thus exposed to a wider range of quality, the advantage probably outweighs the disadvantage.

In a briefing session preceding the actual cutting bee, the judges are instructed on the method of scoring samples. Points which should be considered in scoring each characteristic (i.e., intensity of characteristic olive flavor, presence or absence of various types of undesirable flavors in judging flavor; uniformity of size and color, freedom from fragments in the brine, etc.) are carefully delineated. The judges are requested to work independently, not to talk or otherwise influence their neighbor's judgments, not to smoke, etc. The importance of not allowing a poor appearance to adversely affect a flavor score, or poor flavor to influence texture judgment, is stressed; in practice, of course, it is very difficult for judges to separate completely these factors. At the briefing session the judges are given an opportunity to examine and taste a few "warm-up" olive samples which vary from good to poor in each of the characteristics to be considered.

Immediately following the cutting bee, the judges' scores are totaled and averaged. The flavor, texture, appearance, and total scores for each sample are then placed beside the pan containing those olives. Industry members and guests are invited to return and view the samples side by side with the ratings they achieved. The samples are identified by code number only, of course, but each processor is informed of the numbers of his own samples.

Each year, the scoring performance of the judges is analyzed for consistency of scores on duplicate samples and for deviation from the average, and lists of judges are modified accordingly. Judges who seem to do well are retained in their particular group, whereas those who score inconsistently and atypically are transferred to a group scoring for some other characteristic. It is possible that a poor flavor judge may make a good appearance judge or vice versa.

7.599 (Cross Reference: 1.5)

7.80

ADVANTAGES.--Tables for determining significance are easier to use than charts, and the results may be evaluated more accurately. But care must be used in selecting the appropriate table or chart.

* Table 1 Significance in paired taste tests (p=1/2)
**Table 2 Significance in triangular taste tests (p=1/6)

3.235 MAKING LOBSTER NEWBURG

Anonymous
Food Engineering 28, 177 (April 1956)

Lobster Newburg is made by sauteing 25 pounds of diced, boiled lobster meat in 3 3/4 pounds of butter or margarine for about 3 minutes in a jacketed kettle. Cooking for longer than 3 minutes may toughen the lobster meat.

Dry ingredients added and blended into the batch of sauted lobster meat include 5 ounces of salt, 2 1/2 ounces of paprika, 2 1/2 ounces of ground red pepper, and 2 ounces of ground nutmeg.

Wet ingredients added and blended into the batch include 27 1/2 pounds of cream sauce, which is mixed with the other ingredients until the batch thickens and becomes smooth; and 40 ounces of sherry wine, which is added with agitation after the batch has been allowed to cool.

The lobster Newburg is now ready to package and freeze.

ABSTRACTER: Martin Heerdt

9.7 FISHERY EDUCATION AND TRAINING

Payne, Frederick G.
Pan American Fisherman 10, 12-13 (April 1956)

Today almost every nation in the world that engages in commercial fishing to any appreciable degree has some form of government sponsored educational and training program for the industry, except the United States.

The training facilities in the United States for persons interested in the commercial fisheries field, are extremely limited. There has, however, been a number of recent developments that indicate increasing interest on the part of schools in this field. The following are examples:

A commercial fisheries club is being formed at the Fort Myers, Florida high school. Although no credit courses are offered as yet, they may follow if the club is successful.

The University of Rhode Island is studying the establishment of an adult education course for the commercial fisherman. It will probably cover such subjects as navigation, fishing methods, and insurance.

A 4-H fisheries club has been started recently in Maine, and similar fisheries instruction clubs may be formed in other fishing centers on the Maine coast.

Both the University of Massachusetts and the University of Alaska have shown considerable interest in commercial fisheries. Some courses in fishery technology are now part of the regular curriculum at Massachusetts.

The Portland, Maine high school is conducting a full year's course for students interested in subjects dealing with marine life, navigation, and the production and marketing of fishery products.

Some work dealing with training in commercial fisheries subjects, is being done at Humboldt State Teachers College, Arcadia, California; Oregon State College, Corvallis, Oregon, and the University of Miami, Miami, Florida, although these courses are very limited.

(over)

ABSTRACTER: Kathryn L. Osterhaug

0.32 THE AMINO ACIDS IN THE ICHTHULOKERATIN OF SALMON EGGS

Young, Gordon E. and Smith, Donald G. (Maritime Regional Laboratory, Halifax, Canada)
The Journal of Biological Chemistry 219, 161 (March 1956)

Only a few analyses of the amino acids that occur in pseudokeratins have been published, and these analyses are rather incomplete, with the exception of those for neurokeratin. Some amino acids have been determined in koilin and in the keratin of the egg casings of the dogfish, of the herring, and of the egg shell of the domestic fowl. A few analyses of the conchiolins of mollusks and echinoderms have also been made.

Subdivision of the keratins into eukeratins and pseudokeratins, as proposed by Block, requires further evidence. Pseudokeratins are presently considered to include the keratins of nerve tissue, horse burrs, whale baleen, pelican excrescences, sponges, corals, and egg casings of fish. They differ sharply from the eukeratins in containing much less cystine, and they tend to be more soluble and less resistant to enzymic hydrolysis. The ratio of histidine-lysine-arginine is not 1:4:12 but is nearer to 1:2:3 or to 1:3:4.

The present work was carried out as an extension of previous analyses, with the objective of obtaining more information on the pseudokeratins.

In the authors' work, which is reported in the accompanying table 1, the distribution of 18 amino acids in the ichthulokeratin of the casing of salmon (Salmo salar) eggs was determined, by chromatographic methods.

The similarity of ichthulokeratin to neurokeratin and the ratio of histidine-lysine-arginine of 1:3:4.5 confirm the classification of this protein as a pseudokeratin. The authors found it to be readily digestible by pepsin but not by trypsin.

(over)

ABSTRACTER: F. Bruce Sanford

7.8 INSTRUMENTATION IN QUALITY CONTROL, PART II.

Gould, Wilbur A. (Ohio State University)
Food Packer 37, 30-31 (April 1956)

The progressive food processor maintains a quality control department staffed by trained technologists who use instruments for objective evaluation and for control of quality factors.

The quality of canned products is a result of intelligent and effective control of (1) raw products, (2) production and processing practices, and (3) packing according to given standards.

Effective use of instruments to objectively evaluate product quality assures greater uniformity and standardization of the degrees of quality specified.

Figure 6 is the organizational chart for a quality control department. It illustrates the function of a quality control department and locates it in the management scheme.

(over)

ABSTRACTER: Kathryn L. Osterhaug

LOBSTER NEWBURG FOR FREEZING

PSEUDOKERATIN IN ROE

FISHERY EDUCATION

QUALITY CONTROL

0.32

Table I

Distribution of Amino Acids in Ichthulokeratin of Casings of Salmon Eggs

Amino acid	Per cent amino acid N of N in hydrolysate	Per cent amino acids of original protein	Neurokeratin, gm. amino acid per 16 gm. N
Alanine	4.8	4.9	9.1
Arginine	10.4	5.2	4.2
Aspartic acid	6.0	9.2	3.7
Cystine	2.0	2.7	4.3
Glycine	3.3	2.8	5.0
Glutamic acid	8.6	14.5	11.9
Histidine	1.6	1.0	2.9
Isoleucine	3.2	4.8	11.3
Leucine	4.9	7.4	15.3
Lysine	3.7	3.1	6.3
Methionine	1.0	1.7	1.6
Phenylalanine	3.0	5.7	15.2
Proline	9.0	11.9	3.4
Serine	3.3	4.3	3.3
Threonine	4.4	6.0	9.2
Tryptophan	3.0	3.5	1.3
Tyrosine	2.6	5.4	7.2
Valine	3.7	5.0	5.7
Ammonia	7.2	1.4	
Total	85.7	100.5	120.9

7.8 (Cross Reference: 0.118)

Organization Plan of Processing and Some Typical Analyses of Quality Control Department

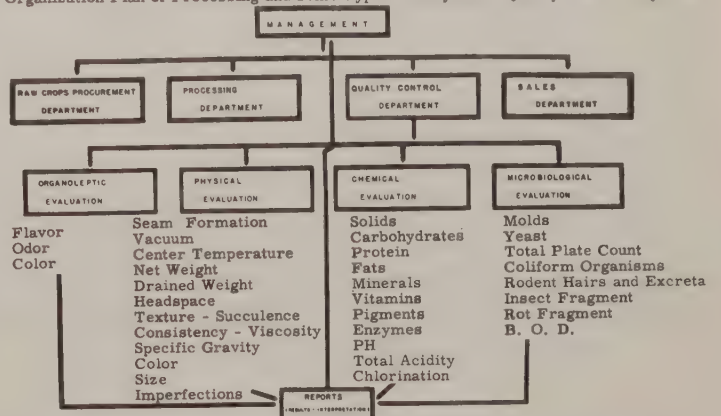


Fig. 6-Proper organization for a quality control laboratory and its place in managerial administration can be outlined as above and maintained for administrative coordination.

3.235

9.7

Commercial fisheries education is receiving increased recognition in other countries. For example: The University of British Columbia, Department of University Extension, is again offering its successful Technological Fisheries Short Course to Practical Fishermen. This course includes classes on oceanography, conservation, fishing gear and methods, quality improvement, international law, and finance loans and insurance.

It was announced recently that schools for fishermen have been established in the Netherlands and in Newfoundland. These courses are sponsored by the respective governments and cover fishing methods as well as quality and marketing problems.

Since the end of World War II Norway has been active in this field, and now has five state-operated vocational training schools. Dr. Trygve Braarud wrote in an Oslo newspaper in part as follows:

"To conduct profitable fisheries is today a question of technical knowhow. That requires knowledge of fishing vessels and their motors, radio-telephonic devices, winches, purse seines and trawls, as well as the mechanical aspects of fish transport. The education provided at Norway's five vocational schools for fishermen is of direct use on the fishing banks. But, perhaps almost as important, is the introduction to the natural basis for our fisheries. For the fishermen learn not only about motor tending, navigation, and cooking, but also about marine plant life, the biology of the various fish species, fish migrations, and fluctuations in the supply of fish."

The educational problemfacing the U. S. fishing industry is really two-fold. First, there is an urgent need for training operating personnel for the industry, primarily at the secondary and vocational school level. This training should be practical fisheries training and would probably include techniques, equipment, methods of handling, processing, packing, marketing, as well as developing the ability to intelligently use valuable information developed through research in fish migration, fish characteristics, marine biology, and so on. Second, there is a critical need for college level training of competent teachers to meet the primary need, and research technicians to carry on much needed technical work.

0.5 MICROBIOLOGY AND SPOILAGE

Maltschewsky, N.
Food Science Abstracts 27, 622 (November 1955)

0.5 SOME HALOPHILIC BACTERIA

Penso, G.
Food Science Abstracts 28, 32 (February 1956)

A report is made of a morphological and physiological study of Micrococcus gadidarum and Amoebobacter morrhuae , 2 halophilic bacteria isolated from spoiled salt cod, and found in many samples of marine salt. Salt for preserving foods should be sterilized by heating in air at 120° C. for 30 minutes.

1.0149 FISH CANNING IN YUGOSLAVIA

Anonymous
Food Manufacture 30, 285 (July 1955)

(Abstract of this article appears under 3.33 page 9 - November 1955)

1.0149 THE KANNIZZATI FISHERY OF MALTA

Burdon, T. W.
World Fishing 4, 20 (July 1955)

(Abstract of this article appears under 2.14 page 9 - December 1955)

1.20 AFRICA'S £ 11 MILLION PILCHARD COAST

Anonymous
Fisheries Newsletter (Australia) 14, 11-13 (April 1955)

(Abstract of this article appears under 1.106 page 1 - October 1955)

1.20 PROBLEMS IN MARKETING MENHADEN PRODUCTS

Miller, Ted
Southern Fisherman 16, 91-93 (January 1956)

(Abstract of this article appears under 6.10 page 17 - May 1956)

1.81 MECHANICAL OYSTER SHUCKER

Anonymous
Southern Fisherman 16, 38 (January 1956)

(Abstract of this article appears under 3.33 page 13 - May 1956)

1.81 COLD STORAGE OF FROZEN PACIFIC OYSTERS (CRASSOSTREA GIGAS) NO. 1

Osterhaug, Kathryn L. and Andrews, Murray
Commercial Fisheries Review 17, 11-14 (December 1955)

(Abstract of this article appears under 3.230 page 5 - June 1956)

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Archives of Biochemistry and Biophysics
Biochemical Journal
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Bulletin of the Japanese Society of Scientific Fisheries
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Canadian Fisherman
Canadian Journal of Chemistry
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Canner
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Chemical and Engineering News
Chemical Engineering
Chemical Processing
Chemistry and Industry
Commercial Fisheries Review
Drug and Cosmetic Industry
FAO Fisheries Bulletin
Federation Proceedings
Feedstuffs
Fisheries Newsletter (Australia)
Fish. Res. Bd. Can., Prog. Repts. Atlantic Coast Stas.
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Fishing Gazette
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Food Packer
Food Preservation Quarterly
Food Processing
Food Research
Food Science Abstracts
Food Technology
Frosted Food Field
Gourmet
Industrial and Engineering Chemistry
Industrial Refrigeration
Institutions
Journal of Agricultural and Food Chemistry
Journal of Applied Chemistry
Journal of Biological Chemistry
Journal of Nutrition
Journal of the American Chemical Society
Journal of the American Dietetic Association
Journal of the American Oil Chemists' Society
Journal of the Association of Official Agricultural Chemists
Journal of the Fisheries Research Board of Canada
Journal of the Science of Food and Agriculture
Maine Coast Fisherman
Meldinger Fra SSF (Herring Industry, Norway)
Modern Packaging
Modern Refrigeration
National Fisherman
National Provisioner
Nature
Nutrition Reviews
Pacific Fisherman
Pan American Fisherman
Poultry Science
Practical Home Economics
Progressive Fish-Culturist
Quick Frozen Foods
Refrigerating Engineering
Report of the Food Investigation Board (Great Britain)
Science
Southern Fisherman
Trade News (Fisheries Department, Canada)
Western Fisheries
World Fishing

Articles chosen for abstracting or inclusion as bibliographical references are those deemed of interest to the commercial fisheries and to fishery technological laboratories. Occasionally pertinent articles from sources other than the above listed publications are included. Biological papers are generally omitted.

- - -

Editorial Clerk (Typist)--Gladys K. Chandler

1.95 U. S. FISH COMPANY WANTS WHALE MEAT AND PRAWNS FROM AUSTRALIA

Anonymous
Fisheries Newsletter (Australia) 15, 5 (March 1956)

A West Coast company is negotiating to purchase up to 12,000 tons of Australian whale meat for use on U. S. fur farms and in pet food.

1.95 UTILIZATION OF SEA LIONS STUDIED

Anonymous
Commercial Fisheries Review 18, 10 (March 1956)

2.05 THE SCIENTIFIC FOUNDATION OF SANITARY CONTROL OF FROZEN AND CURED FISH PRODUCTS

Symposium on cured and frozen fish technology, Swedish Institute for Food Preservation Research, Göteborg, No. 100, Chapter 16, pp 1-5 (November 1953)

(Abstract of this article appears under 2.00 page 5 - December 1955)

2.05 MICROBIOLOGICAL HAZARDS OF PRECOOKED FROZEN FOODS

Straka, Robert P. and Stokes, J. L.
Quick Frozen Foods 18, 182-186 (February 1956)

(Abstract of this article appears under 3.235 page 19 - May 1956)

2.19 PRESERVATION OF FISH IN TRAWLER HOLDS II. THE EFFECT OF VARIOUS TYPES OF PEN SURFACES ON THE KEEPING TIME OF FISH

MacCallum, W. A.
Fisheries Research Board of Canada, Progress Reports of the Atlantic Coast Stations 59, 18-22 (August 1954)

(Abstract of this article appears under 2.15 page 5 - February 1956)

2.19 PRESERVATION OF FISH IN TRAWLER HOLDS III. SCREENS AS A PROTECTION AGAINST CONTAMINATED PEN WALLS

MacCallum, W. A.
Fisheries Research Board of Canada, Progress Reports of the Atlantic Coast Stations 59, 22-27 (August 1954)

(Abstract of this article appears under 2.15 page 5 - February 1956)

3.5 DISCUSSION ON THE PREPARATION OF MATJES HERRINGS

Biegler, P.
Food Science Abstracts 27, 617 (November 1955)

3.5 RUSSIA DEVELOPS HER FISH INDUSTRIES

Anonymous
Food Manufacture 30, 395-436 (October 1955)

(Abstract of this article appears under 3.30 page 11 - March 1956)

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3.249 PACKAGING FROZEN FISH IN TIN RESULTS IN SUPERIOR STORAGE

Stansby, M. E.
Commercial Fisheries Review 17, 17-20 (July 1955)

(Abstract of this article appears under 3.238 page 9 - January 1956)

3.249 RECENT DEVELOPMENTS IN THE FREEZING OF FISH AT SEA
II. THE QUALITY OF SEA FROZEN COD

Banks, A.
Chemistry and Industry 43, 1360-1362 (October 22, 1955)

(Abstract of this article appears under 2.118 page 7 - May 1956)

3.249 FREEZING AND COLD STORAGE OF PACIFIC NORTHWEST FISH AND SHELLFISH: PART V. PALATABILITY AND COLD STORAGE LIFE OF BLACKTIP ROCKFISH (SEBASTODES ALEUTIANUS) AND FLAG ROCKFISH (SEBASTODES RUBRIVINCTUS)

Miyauchi, D. T. and Alverson, D. L.
Commercial Fisheries Review 17, 17-18 (September 1955)

(Abstract of this article appears under 1.4 page 1 - March 1956)

3.26 MARKET TASTING --THE STOP AND GO FOR NEW FROZEN PRODUCTS

Anonymous
Quick Frozen Foods 18, 39-41 (December 1955)

(Abstract of this article appears under 2.6 page 9 - March 1956)

3.26 ANALYSIS SHOWS OUTPUT, MOVEMENT OF FROZEN SEAFOOD

Anonymous
Frosted Food Field 22, 12 (April 1956)

3.26 CHAIN TESTS FROZEN, WAXED MEAT CUTS: TRADE SCANS MOVE

Anonymous
Frosted Food Field 21, 8-9 (October 1955)

(Abstract of this article appears under 3.238 page 11 - March 1956)

3.33 AN IMPROVED SYSTEM OF RETORT INSULATION

Pircon, L. J. and Loquercio, P. A.
Food Science Abstracts 27, 712 (November 1955)

3.33 EXPERIMENTS WITH THE ROTOCLAVE IN PRACTICE

Rievel, H. and Reuter, H.
Fleischwirtsch 7, 169-173 (1955) (Summary in English)
Food Science Abstracts 27, 490 (September 1955)

Extensive trials of the rotatory autoclave technique for canning meat products have demonstrated that the quality of the canned meats, as judged by flavor and appearance, was markedly improved. Cans withstood incubation for 4 weeks at 37° C., even when contaminated with heat-resistance spores, whereas those retorted by normal methods swelled within 5 to 10 days under similar conditions.

3.33 FOOD STERILIZATION METHODS, THE FUTURE

Ball, C. Olin
Food Technology 9, 588-590 (November 1955)

(Abstract of this article appears under 3.19 page 9 - April 1956)

3.8 MICROBIOLOGICAL PROBLEMS OF SEMI-PRESERVED MEAT

Buttiaux, H.
Symposium on cured and frozen fish technology, Swedish Institute for Food Preservation Research, Göteborg, No. 100, Chapter 6 (November 1953)

(Abstract of this article appears under 0.5 page 1 - October 1955)

3.8 STUDIES AND OBSERVATIONS ON THE INITIAL WEIGHT AND FINAL WEIGHT IN FRIED HERRING MARINADES

Biegler, P.
Food Science Abstracts 27, 617 (November 1955)

3.8 ANNUAL REPORT TO THE DANISH FISHING INDUSTRY

Anonymous
Årsbertning fra Fiskeriministeriets Forsøgslaboratorium for 1954, 32 pages (1955) (Copenhagen, Denmark)

(Abstract of this article appears under 3.30 page 11 - January 1956)

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